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CONTENTS

ELSIE MURRAY. *The Spelling Ability of College Students* 357

ROBERT A. CUMMINS. *'Bright' and 'Slow' Pupils in Elementary and High School* 377

MAUDE A. MERRIL. *A Scale for Individual Measurement of Reading Ability* 389

EDITORIAL 401

NOTES AND NEWS 403

PUBLICATIONS RECEIVED 408

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THE JOURNAL OF
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THE SPELLING ABILITY OF COLLEGE STUDENTS

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I. PROBLEM

The apparent decline in spelling ability in the present generation of college students has been subject to various interpretations by parents and instructors. The latter are inclined to cast the blame upon lowered standards of instruction and achievement in the schools; the former, to minimize spelling as on the whole an inferior, and, in the present era, a somewhat superfluous accomplishment. The student himself is prone to shift the responsibility for his shortcomings upon some extraneous factor, associated with the educational system to which he has been subjected; *e. g.*, forced speed in note-taking, and the attendant deterioration of handwriting and spelling together; the study of foreign languages, and the resultant confusion of English words with those of similar origin in other tongues; current interest in phonetic spelling, and the like. Excuse is also sometimes offered on the basis of purely intrinsic peculiarities; a strain of bad spelling hereditary in the family (a Mendelian unit characteristic, as it were); a natural distaste for this 'branch of learning'; etc.....

To the scientific inquirer, various other explanatory factors suggest themselves: the possible role, under current methods of instruction, of a defective equipment along the lines of visual imagery; the probably influence (in many cases of so-called 'hereditary bad spelling') of 'social heredity,' *i. e.*, the perpetuation of parental shortcomings through family correspondence (of especial importance in this era when every decade sees a smaller proportion of college freshmen recruited from families in which the use of correct English is a tradition). There remains a considerable residue of apparently

inexplicable cases; and to these especially the interest of the writer has been attracted by the circumstance that the four most aggravated cases of bad spelling personally encountered in a number of years have resolved themselves upon examination into instances of defective hearing, vision, articulation, and of an excessively nervous temperament, respectively. Additional observations have suggested the possibility of a definite correlation between spelling capacity in the individual and other abilities, *viz.*, accuracy in certain branches; clearness or mistiness of ideas; likelihood of success or failure in various college subjects. Hence, while relegating the improvement of methods of instruction to pedagogical science, the psychologist may find to his hand a problem of no less interest in the investigation of the intrinsic causes of poor spelling and their significance to the individual.

Apart from these theoretical interests, the following study was intended to serve a practical and pedagogical purpose. For some time, the writer had entertained a suspicion that the blame for the semi-illiterate spelling of many of our graduates rests less upon the defects of early instruction than upon the irrational attitude of college instructor and student; an attitude, on the one side, of exasperation and scorn; on the other, of happy-go-lucky indifference, pessimism, fatalism— 'once a poor speller always a poor speller.' One immediate aim was, therefore, to break up this pessimism of the student, to create in its place an attitude of self-criticism, an interest in the orthographic integrity of the word as the outward symbol of the idea. With this in view, the college bulletin board was pressed into service, graphs representative of scores, tabulation of results for different classes, improvement, etc., posted. An attempt was also made to modify the instructor's attitude by dwelling on the fact that the acquisition of an adult spelling vocabulary cannot reasonably be relegated to the grades, but should (and with a little attention does) run parallel to the development of the corresponding concepts throughout the college course. Secondarily the study served also the purpose of illustrating to students in education modern methods of attacking and presenting pedagogical and related problems.

II. Material, Methods, Subjects.

List A. The first test consisted of 20 words, selected at random from a list of words commonly misspelled by students in philosophy and psychology, compiled by the writer over a number of years.

In order to avoid misunderstandings (such as the mistaking of *rhythm* for *ribbon*), the enunciation of each word in the test was followed immediately by reading an illustrative phrase. (This phrase was not written down by the student). The list comprised the words: *rhythm, judgment, definite, parallel, embarrass, repetition, nucleus, separate, reverence, hereditary, paralysed, omitted, tendency, analyse, efficient, primitive, mathematics, sensible, explanatory, disappointed.* Approximately 3 minutes was consumed in the test.

All members of the four college classes, 204 in all, were given this test, in small sections, in the fall of 1917. Since a number of the students tested declared that, while unable now to spell a number of these words, they had been able to spell them all when in the grades, their spelling having deteriorated while in college, it was thought of interest to try the test upon the seventh and eighth grades in the public schools, 284 pupils of which were available. The test was also given to 69 members of library training classes.

Six months later the junior and senior classes were retested with the same list.

List B. This test was made up on somewhat different lines. Twenty words were selected from the published lists of Kallom and others, representing as far as possible the typical difficulties of English spelling. The list included *precipitated, occurrence, mortgage, twelfth, principal, proceeded, mischievous, marriageable, preceded, achievement, superintendent, chimneys, height, receipt, desiccated, relieved, principle, all right, privilege, misspelled.* These words were incorporated in a series of sentences, which were cut up into 24 phrases, and read at a uniform rate, with a pause after each phrase, the whole consuming about 6 minutes.

The student was not informed that her spelling was being tested, but was merely told that a dictation exercise would be given, at a fairly rapid rate; that strict attention must be paid, as no portion would be repeated; that no abbreviations could be used, and all i's must be dotted and t's crossed; that no alterations should be made in a word once set down; and lastly that the sense of the selection must be noted in order to ensure the writing of the correct word. These instructions were formulated in order to secure a measure of the normal spelling ability of the student, by approximating as far as possible the conditions of spontaneous writing, in which the cue is afforded by verbal imagery (visual or otherwise), and in which the attention is not unduly centered upon the mechanics of spelling.

With this end in view no special effort was made to enunciate each syllable with absolute distinctness, and the speed kept up was such that as a rule the subject must write the crucial words in the pauses between the phrases, from auditory after images. Further, the prohibition against the altering of words once set down was designed not so much to obviate the possibility of correction from a neighbor's copy, as to avoid a source of confusion revealed in the earlier test; in which the well-known law of attention (according to which any complex figure, such as a word, on being submitted to inspection for a given time, tends to break up into new parts, and take on a strange aspect) came into operation, with the result that many words at first correctly written were afterwards erroneously altered by the student in a fit of self-consciousness.

This test was given the Seniors and Juniors only, in the fall of 1917, and repeated in the spring of 1918, six months later.

III. Results. What Do The Test Scores Mean?

List A. Distribution of Scores. Their Significance. (a) *Superiority of Upper Class Scores.* There is not only a progressive increase (though slight) in the number of words spelled correctly from the freshman to the junior year (see Table I), but also a decided superiority of the college over the seventh and eighth grade scores. This

TABLE I. LIST A. QUARTILE DISTRIBUTION OF SCORES

	Grades		College			
	Seventh	Eighth	Freshmen	Sophomore	Junior	Senior
Best	16	19	20	20	20(20)	20(20)
75%ile **	12	14	18	19	19(20)	19(20)
Median	*9*	*11.5*	*16*	*17*	*18*(19)	*18*(19)
25%ile	7	9	14	15	17(18)	17(18)
Worst	1	4	9	7	14(15)	14(10)
Number tested	167	122	77	54	37	36

**The 75 percentile in this table is the score attained or exceeded by 25% of the group; fallen short of by 75%.

increase may, of course, be interpreted not as indicative of improvement in spelling ability with each successive year in college, but merely as a by-product of selective forces operating from college entrance to the senior year; a view apparently supported by the fact that in the junior year, when elimination practically ceases, the spelling scores also become stationary. Since, however, elimination

is usually on the basis of scholarship, and spelling ability and scholarship by no means run parallel (see below), it seems justifiable to overlook the selective factor, and interpret the rise in scores as at least controverting the student claim that spelling necessarily deteriorates in the course of a college career, if not, indeed, indicating a tendency toward positive improvement.

b) *Improvement in Scores on Repetition of the Test.* To test further the susceptibility to improvement in spelling during the college course, the test was repeated after the lapse of six months, with the two upper classes. No warning of this repetition was given, though in the meantime the scores for the four college classes had been posted, along with a copy in script * * * of the twenty words, in the order of the frequency of their misspelling. In the case of the seniors, the subject of spelling in general, and of improved methods of instruction had been discussed in a class in education.

The resulting scores (see Table I in parentheses) show a general improvement, though there are numerous irregularities, reflected in the relatively low correlation between the first and second set of records, +.50 for the senior class, +.60 for the junior. It is interesting to note that a few students maintained that the first exercise was to a certain extent disorganizing, made them over-selfconscious in their spelling, and created an attitude of uncertainty. As a matter of fact, in the group of 73 juniors and seniors, three originally perfect scores fell off one point on second trial, four others dropped slightly, while the score of one Senior fell from 14 to 10. It seems reasonable, however, to interpret this merely as a general instability in spelling arcs or images (indicated even in the original test by numerous alterations in the written word), rather than as a positive deterioration.

Further, personal knowledge of the individuals inclines the writer to the opinion that the individual differences in amount of improvement indicate not so much difference in degrees of improvability, as differences in incentive to improvement. No special appeal for improvement was made in connection with the test, but students with known ambitions along cultural or vocational lines undoubtedly made the greatest effort. The results may, therefore be taken to indicate what may be accomplished with a proportionately small expenditure of time and attention.

***Script was adopted on the theory that the uncertainty of students in the spelling of their adult vocabulary may be due in part to lack of clear visual images *in script* of words which they have many times encountered in print.

c) *Discrepancies between Scores* and *Self-Estimates.* Each subject, before submitting to the spelling test, was requested to rate herself as a *good, poor,* or *medium,* speller. The resulting estimates are interesting, first of all, in view of the variations in the percentage of '*Good*' and '*Poor*' judgments given by members of each class (see Table IIa). The proportion of '*Good*' decreases steadily from seventh grade to the sophomore class, where it undergoes a sudden inflation, to fall again through the senior and junior years. Whether or not these fluctuations represent characteristic tendencies toward over and underestimation in general will afford interesting matter for further experimentation.

TABLE IIa. DISTRIBUTION OF SELF ESTIMATES (*Percentage*)

	GRADES		COLLEGE			
	Seventh	Eighth	Freshmen	Sophomore	Junior	Senior
GOOD	43%	35%	23%	44%	30%	25%
MEDIUM	48	55	64	41	43	58
POOR	9	10	13	15	27	17

As to the approximate reliability of these subjective estimates, it may be noted that for the four college classes the number of misspellings in the individual scores averages twice as great for those estimating themselves as 'Poor' as for those estimating themselves as 'Good.' (See Table IIb) At the same time, in the group of 204

TABLE IIb. RELATION OF SELF ESTIMATES AND SCORES

Self Estimate	Freshmen	Sophomore	Junior	Senior		Total Average
Good	17.4	16.9	18.1	18.6	Average Score	
	2.6	3.1	1.9	1.4	Average Error	2.2
Poor	12.9	12.3	16.8	17	Average Score	
	7.1	7.7	3.2	3	Average Error	5.2

college students, of the 62 estimating themselves as good, only 8 (or approximately 13%) made a perfect score; although 43 of the 62 (about 70%) scored above the median for the College (17). The most striking cases of discrepancy are tabulated in Table IIc below.

The more extreme cases of over-estimation cited above (*i. e.,* of students rating themselves as 'Good' and scoring low in the test) would seem to indicate, as we had anticipated, the need of establishing a more critical attitude toward self-accomplishment. On the

TABLE IIc. OVER AND UNDER ESTIMATIONS

	OVERESTIMATIONS			UNDERESTIMATIONS	
Individuals whose self-estimate = 'Good'				= 'Poor'	
Class	Median Score	Number	Scores	Number	Scores
Seventh	9	2	4 and 5	1	16
Eighth	11.5	2	8 and 9	1	15
Freshman	16	2	12 and 15	1	18
Sophomore	17	2	13 and 14	1	17
Junior	18	4	16 and 17	1	19
Senior	18	1	17	2	19

other hand, the cases of under-estimation (*i. e.*, of students rating themselves as 'Poor' and scoring fairly high in our test), while relatively few, and possibly explicable as instances of exaggerated self-depreciation, tend to cast some doubt upon the reliability of our test as a measure of spelling ability. This doubt is further substantiated by the skewing of the curve of distribution for the college scores toward the upper end of the scale; a fairly certain indication of the use as measuring rod of a test too easy for the group. (See Table III).

TABLE III DISTRIBUTION OF SCORES (LIST A) FOR THREE GROUPS

Scores	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
GRADES	4	1	3	5	12	21	18	30	31	**42**	23	28	27	15	16	5	4	3		
LIBRARY						2				1	1	1	6	9	8	**7**	9	13	10	2
COLLEGE							1		2	1	5	4	8	14	17	22	**45**	24	46	15

d) *Value of List A as a Measure of the Spelling Ability of the College Student.* There are four possible criteria of the value of such a list; comparison of the records, first, with actual school grades in spelling; second, with degree of success in a standardized exercise in checking misspelled words; third, with self estimates; fourth, with the scores of a second spelling test. The first method was feasible only with the seventh and eighth grades, and, since it seemed hardly likely that conclusions arrived at on the basis of data from younger students would be valid for older ones, was abandoned. The second yielded a low correlation (+.40 for seniors, +.39 for juniors). Since, however, experiment has shown that ability to reproduce and to recognize do not necessarily run parallel, this evidence was also finally rejected as negative. The third criterion, comparison with self-estimates, upon closer scrutiny, guided by a knowledge of individual cases, appeared to be too much complicated by subjective factors, over-confidence and over-modesty, to stand by itself. Hence it seemed advisable to devise a second test, which, if not representing a fairer sample of the student's writing vocabulary, should at least present more of the fundamental difficulties of the English language.

TABLE IV a. FREQUENCIES. LIST A. AND B. SCORES FOR 37 SENIORS AND 37 JUNIORS.

Scores=		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
List A	Junior									3		4	8	6	11	5
	Senior									3	1	3	10	7	8	5
List B	Junior	1				1	1	4	6	2	5	5	6	4	2	
	Senior	1		1		2	1	1	3	7	6	5	3	6	1	

TABLE IV b. QUARTILE DISTRIBUTION OF SCORES

	Juniors		Seniors	
Test	A	B	A	B
Best	20	19(19)	20	19(19)*
75%ile	19	17(17)	19	17(18)
Median	18	15(16)	18	15(17)
25%ile	17	13(14)	17	14(16)
Worst	14	6 (9)	14	6 (9)

B. *List B. Scores and Their Significance*

a) *Distribution of Scores*

The median score for both juniors and seniors is lower than in Test A (15 as against 18—see Table IV b), and there is a wider range between the limits (6-19 as against 14-20 for Test A). That is, the test is more difficult, brings out a wider range of individual differences, and therefore gives greater promise of gauging the spelling ability of the group. The junior and senior records again closely parallel each other, corroborating the findings of Test A, and indicating cessation of progress with the junior class.

b) *Improvement on Repetition.* This test also was repeated six months later, less attention, however, having been paid in the meantime to the list, which had merely been written once on the blackboard for each class. There is, again, a general improvement in the scores for the second trial, showing that many took the lesson of the first one to heart, though no special effort was made to impress it. The degree of improvement is greater for the senior than the junior class, the median score rising from 15 to 16 for the latter, to 17 for the former; probably for the reasons already indicated, and perhaps also because of the more serious attitude of the senior as the close of her college career approaches, and the problem of vocational qualifications begins to assume importance.

*The figures in parentheses represent the results of the second trial.

The correlation between the individual scores for trials 1 and 2 is slightly higher than for List A (+.62 for Seniors, +.65 for Juniors). There are, however, as in the case of the earlier test many irregularities in the degree of improvement, due probably in part to inequality of effort and interest, in part to chance factors. It is, for instance, discouraging to note that in the case of the two Seniors registering the greatest gain in the second trial in List A, the score of the one remains stationary on retrial in List B, while that of the other drops. In all, in the group of 74, there are 14 cases of lowered scores, as against 8 in the retrial of List A, (see Table IV c). The greatest drop, however, is of 3 points only (1 case); while 17 records register gains of 3 to 5 points, and the total number of misspelled words is reduced from 360 to 283. Of those registering 3 points improvement, 6 were individuals estimating their spelling ability as 'Poor', thus demonstrating the value of even a minimum of scientific attention to the spelling of the adult. A more systematic direction of effort would probably have brought up the scores of the 6 'Poor' cases whose scores either remained stationary or dropped.

c) *Correspondence between Self Estimates and Scores.* Here as in Test A the average number of errors scored by those estimating

TABLE V a.

	List A			List B			
Self Estimate	Junior	Senior	Av.	Junior	Senior	Av.	
Good	1.9	1.4	*1.6*	4.4	3.2	*3.8*	Average Error
	18.1	18.6		15.6	16.8		Average Score
Poor	3.2	3	*3.1*	7.6	7.3	*7.4*	Average Error
	16.8	17		12.4	12.7		Average Score

their ability as 'Poor' is nearly twice that scored by those estimating themselves as 'Good' (see Table V a.); while the average score of the 'Poor' falls as before in the lowest quartile of the group records. Also, as before, there is a slightly closer correspondence between estimates and test scores in the case of the seniors than of the juniors.

While there is no striking difference in the figures for the two tests as shown in Table V a, it will be seen by reference to Table V b that Test B is effective in reducing the cases of most glaring discrepancy between estimates and scores from 8 to 4, eliminating them entirely in the case of the seniors.

TABLE Vb.

Test A	
No. Juniors estimating themselves as 'Good' who score below median	=4
No. Seniors estimating themselves as 'Good' who score below median	=2
No. Juniors estimating themselves as 'Poor' who score above median	=1
No. Seniors estimating themselves as 'Poor' who score above median	=1
	8=Total
Test B	
No. Juniors estimating themselves as 'Good' who score below median	=3
No. Seniors estimating themselves as 'Good' who score below median	=0
No. Juniors estimating themselves as 'Poor' who score above median	=1
No. Seniors estimating themselves as 'Poor' who score above median	=0
	4=Total

d) *Reliability of Test B as a Measure of Spelling Ability.* The correlation of scores with misspelled word checking records is lower for List B than for List A; +.34 for juniors, +.38 for seniors. Combination of the results from the two lists, however, raises these coefficients to +.40 and +.54, whatever the significance of this fact may be (see above). The evidence furnished by the comparison of self estimates and scores is positive, indicating the greater reliability of the second list (see paragraph c). The low correlation of the scores for the two tests (+.50 for Seniors, +.42 for Juniors) is susceptible of various explanations. It is possible that it is due in part to a difference in method, the second test calling for stricter concentration, and putting a higher premium upon speed and poise. It undoubtedly also indicates the lower reliability of one of the tests, or of either taken singly. Therefore, in what follows the combined scores of the two tests are used as probably furnishing a more reliable measure of spelling ability than either taken singly.

IV. Correlation of Spelling Ability with Other Abilities

a) *Spelling Ability and Accuracy in General.* The correlation between rank in the spelling tests and in a single addition test (Thorndike's single-digit short-column test) is low (+.29)*; while that between spelling and grading in freshman mathematics is even lower, averaging +.12½ for juniors and seniors. It is, further, worthy of note throughout the results that individuals specializing in mathematics in the junior or senior year almost invariably rank low in spelling.

*Calculated for juniors only.

At the same time, the correlation between the spelling scores and a composite accuracy score ** is fairly high, averaging +.65. Since the corresponding correlation with a composite reasoning tests score (based on ten tests in hard opposites, logical memory, hard directions, mixed relations, definitions, paragraph completion, word building, proverb matching, information, classification of concepts) is lower, +.59, and that with academic grades for three years (seniors

TABLE VI.

CORRELATION COEFFICIENTS (*Method of Rank Differences*)

	Misspelled Word	Addition Test	Accuracy Tests	Reasoning Tests	Definition Test	
Av. Spelling Scores	+.40		+.62	+.57	+.62	Senior
" " "	+.54	+.29	+.72	.	+.54	Junior
	+.47		+.67		+.59	Average

	College Grades	Mathematics	Latin	English	
Av. Spelling Scores	+.42	+.13	+.44	+.59	Senior
		+.12	+.23	+.52	Junior
		+.12½	+.33½	+.5½	Average

only) only +.42, the evidence seems to indicate that spelling ability possesses a closer relation to the factors making for accuracy than it does to those making for general intelligence or academic ability.

b) *Spelling Ability and Standing in College Courses.*

English. In correcting a definitions test (based on the Terman and Kirkpatrick vocabulary lists), observation of the confusion to which the student mind is subject in the case of words of similar sound or appearance (such as chagrin and shagreen, fin and fen, ochre and ogre) gave rise to the suggestion that the vagueness of verbal images evident in the one test might correlate high with the vagueness of orthographic images in the other; the ability to manip-

**Based on ten tests in the case of Seniors—checking misspelled words, easy directions, digit and group digit cancellation, handwriting pairing, spelling, handwriting, learning, immediate memory, addition; on the first six only in the case of juniors.

ulate the outward form (spelling) with that to manipulate the inner core or meaning. As a matter of fact, the average correlation coefficient between the spelling and definitions tests for the two upper classes is +.58; between spelling and grades in freshman English, +.59. The correlation with the reasoning tests is also +.59; but since the latter were of a type largely dependent on verbal facility no less than thought processes it may perhaps be fairly assumed that spelling is a correlate not only of a general tendency toward accuracy, but also though perhaps in a lesser degree, of the subject's interest in English as a medium of culture and self-expression; that clear-cut verbal concepts to a certain extent presuppose firmly fixed spelling neurograms. There are, of course, numerous exceptions. Moreover, individuals may undoubtedly be letter perfect in spelling as a mechanical exercise, and possess only the vaguest concepts of the meanings of words they spell.

Latin The close dependence of spelling ability upon familiarity with Latin roots has been strongly argued by more than one classical instructor. It is, therefore, worthy of remark that the correlation between the spelling scores and grades in freshman Latin,* while higher than that for freshman mathematics (+.12½), is nevertheless low enough to be negligible (+.33½).

V. Causes of Misspelling

a. *General.*

Words most frequently misspelled. The relative difficulty of the words in the two lists used is indicated by the Tables VIIa and b, which give the per cent. of errors scored for each word. An attempt has been made also to analyse the sources of trouble in the forty words used, and to estimate their relative importance (see Table VIII). While the classification adopted is admittedly unsatisfactory, and the captions selected not always mutually exclusive, the scheme presented serves the purpose of emphasizing some of the typical difficulties on which attention needs to be centred in any constructive effort to improve the spelling of the individual.* The first four heads of the classification (covering more than half of the words in the lists, and including those on the whole most subject to error) represent, of course, difficulties intrinsic to the unphonetic character

*Calculated for seniors and juniors only.

Note* The construction of the two lists was, of course, too casual to admit of any sweeping generalisations on the basis of Table VIII as to the most important sources of spelling difficulty either in the language at large, or in the vocabulary of the college student.

TABLE VIIa.

PERCENTAGE FREQUENCY OF MISSPELLINGS. LIST A. 204 COLLEGE STUDENTS

	List A	Per Cent Misspellings	Most Common Error
1.	embarrass	56.3*	embarass
2.	paralysed	42.3	paralised
3.	rhythm	36.7	rythm
4.	judgment	35.8	judgement
5.	repetition	24	repitition
6.	analyse	23	analise
7.	nucleus	22	neucleus
8.	hereditary	10.7	heriditary
9.	primitive	10.3	primative
10.	definite	9.3	definate
11.	reverence	7.9	reverance
12.	explanatory	6.9	explanitory
	tendency	6.9	tendancy
13.	mathematics	6.4	mathamatics
	parallel	6.4	paralell
14.	disappointed	5 9	dissapointed
15.	separate	5.4	seperate
	efficient	5.4	effecient
16.	omitted	3.4	ommitted
17.	sensible	1.5	sensable

TABLE VIIb.

PERCENTAGE FREQUENCY OF MISSPELLINGS. LIST B. 74 COLLEGE JUNIORS & SENIORS

	List B.	Per Cent Misspellings	Most Common Error
1.	desiccated	98.6	dessicated
2.	all right	54	alright
3.	preceded	48.6	preceeded
4.	occurrence	35	occurence
5.	marriageable	27	marriagiable
6.	privilege	25.7	privelege or priviledge
7.	misspelled	21.6	mispelled
7.	superintendent	21.6	superintendant
8.	mischievous	20.2	mischeivous
9.	mortgage	17.5	morgage
10.	chimneys	16.2	chimnies
10.	twelfth	16.2	twelth
11.	precipitated	14.8	percipitated
12.	achievement	13.5	achievment or acheivment
12.	proceeded	13.5	proceded
12.	height	13.5	heighth
13.	principal	10.8	principle
14.	principle	9.4	principal
15.	relieved	8.1	releived
16.	receipt	6.7	receit

*I. e., approximately 56 out of every 100 college students may be expected to misspell the word *embarrass*.

of our mother tongue. The remaining three heads represent difficulties assignable rather to 'psychological' or individual and remediable causes. For while it might be argued that the seventh difficulty has its real origin in the excessive variability of our language in its ways and means of representing practically identical sounds (see heading 1), it seems equally valid to attribute it to lack of finesse in the training of the ear and the mechanism of articulation (thus practically identifying it with heading 6). The median liability to error is only slightly higher for the first four classes of words division 1)—14.9 per cent.—than for the last three (division II)—10.7 per cent.—hence it seems probable that considerable improvement in spelling may be effected without having recourse to spelling reform.

b. *Individual.*

Relaton of Defective Vision, Hearing, Articulation, etc., to Spelling Ability. In order to investigate more minutely the possible causes of good and bad spelling, each of the 74 juniors and seniors was requested to fill out a questionaire, the fifteen or more heads of which referred in part to amount and character of early training, in part to preferences in school studies, in part to corrected or uncorrected defects in vision and hearing. The more significant data contained in the answers of the twenty worst and the twenty best spellers have been tabulated and summarized (along with certain facts gathered from other sources) in Tables IX A, B and C. Table IX A, read from left to right, shows the *average spelling score* of the subject, her *own estimate* of her spelling ability, whether or not the majority of her *family* are *good spellers*, whether she *liked* or *disliked spelling* as a school subject, whether she was drilled on a *speller* or *selected lists* of words in the grades, whether the study was continued into the *High School*, whether her *vision*, *hearing*, and *articulation*, are good or not, her *handwriting legible*, her *temperament* high-strung, even, or lazy, her *academic work* above or below par, her *preference* for literary mathematical, historical, scientific, classical, or musical studies.

Examination of these Tables would seem to corroborate the view that individual peculiarities (more especially defective hearing, vision, or articulation) form the most formidable handicap to the acquisition of habits of correct spelling. At the same time it must be admitted that there is no one decisive factor, but in practically every case a number of coordinate and interlocking causes.

TABLE VIII TYPICAL ERRORS AND THEIR FREQUENCY. LISTS A AND B.

CLASSIFICATION			FREQUENCY	NUMBER OF WORDS
I. 1.	Substitution of similar sounding vowels and diphthongs:	paralise	42.3%	5
		analise	23	
	i for y	mischeivous	20.2	
	ei and i	releived	8.1	
		acheivement	6.7	
		Median =	20.2	
2.	Doubled letters:	dessicated	98.6	8
		embarass	56.3	
		occurence	35	
		mispelled	21.6	
		proceded	6.7	
		paralell	6.4	
		disapointed	5.9	
		ommitted	3.4	
		Median =	14.1	
3.	Analogy:	alright (always)	54	9
		preceeded (proceeded)	48.6	
		judgement (acknowledgement)	35.8	
		chimnies (berries)	16.2	
		heighth (breadth)	13.5	
		priviledge (knowledge)	12.8	
		principle	10.8	
		principal	9.4	
		preceeded (for proceeded)	6.7	
		Median =	13.5	
4.	Silent letters:	rythm	36.7	4
		morgage	17.5	
		achievment	6.7	
		receit	6.7	
		Median =	12.1	Total = 26 (24)
II. 5.	Influence of other syllables in the same word:	repitition	24	4
		neucleus	22	
		heriditary	10.7	
		effecient	5.4	
		Median =	16.3	
6.	Faulty pronunciation:	twelth	16.2	5
		percipitated	14.8	
		heighth	13.5	
		heriditary	10.7	
		effecient	5.4	
		Median =	13.5	
7.	Unaccented syllables (substitution of similar sounding vowels):			
	e and i	repitition	24	11
		privelege	12	
	a and i	primative	10.9	
		definate	9.3	
		explanitory	6.9	
		sensable	1.5	
	a and e	superintendant	21.6	
		reverance	7.9	
		tendancy	6.9	
		mathamatics	6.4	
		seperate	5.4	
		Median =	7.9	Total = 20 (17)

TABLE IX A.

INDIVIDUAL CASES OF THE TWENTY BEST SPELLERS IN THE JUNIOR AND SENIOR CLASSES

Subj.	Class	Spell Score	Self Est.	Fam.	Lik.	Meth.	H. S.	Hear.	Vis.	Art.	Hwt.	Temp.	Aca. Gr.	Subject Most	Subject Least	Eng.
1.	S	19.5	M	G	Yes	Sp.	No	G	G	G	G	Even	M	Lit.	Math.	G
2.	S	19.5	G	G	Yes	Sp.	No	G	G	G	M	Even	G	Lat.	Sci.	G
3.	J	19.	M	G	Yes	Sel.	Yes	G	G	G–	G	Nerv.	M	Math.	Sci.	P
4.	J	19.	M	G	Yes	Sel.	No	G	M	G	G	Laz.	M	Lit.	Math.	G
5.	J	19.	M	G	Yes	Sp.	No	M	P	G	G	Even	G	Math.	Art	G
6.	S	18.5	G	G	Yes	Sp.	Yes	G	G	G	G	Even	G	Mus. & Lit.	Lat.	G
7.	S	18.5	G	G	Ind.	Sp.	No	M	M	M	G	Even	G	Lit.	Math.	G
8.	S	18.5	G	G	Yes	Sp.	No	G	P	G	P	Nerv.	M	Lit.	Math.	G
9.	J	18.5	G	M	Yes	Sp.	No	G	G	G	G	Even	G	Hist.	Lat.	M
10.	J	18.5	M	G	Yes	Sp.	No	M	M	G	M	Nerv.	P	Mus. & Lit.	Lat.	P
11.	S	18	G	G	Yes	Sp.	No	G	M	G	M	Nerv.	P	Lit.	Math.	M
12.	S	18	G	G	Yes	Mix.	No	G	M	G	M	Nerv.	P	Lit.	Math.	M
13.	S	18	M	G	Ind.	Sp.	Yes	G	G	G	G	Even	G	Lit.	Math.	M
14.	S	18	M	P	Yes	Sp.	Yes	M	M	G	M	Even	M	Lit.	Sci.	M
15.	J	18	M	M	Yes	Sp.	Yes	G	G	G	G	Nerv.	G	Mus. & Lit.	Math.	G
16.	J	18	M	G	Yes	Sp.	No	M	G	G	P	Even	G	Lit.	Sci.	G
17.	J	18	G	G	Yes	Mix.	Yes	G	M	G	M	Even	G	Lat.	Mus.	M
18.	J	18	G	G	Yes	Sp.	Yes	G	M	G	G	Even	M	Lit.	Math.	P
19.	J	18	G	G	Yes	Mix.	No	G	M	G	G	Even	M	Lit.	Math.	M
20.	J	18	G	G	Yes	Mix.	Yes	G	M	G	P	Even	M	Lit.	Lat.	M

In the above table, G = Good, M = Medium, P = Poor, Ind. = Indifferent.

TABLE IX B.

INDIVIDUAL CASES OF THE TWENTY WORST SPELLERS IN THE JUNIOR AND SENIOR CLASSES

Subj.	Class	Spell. Score	Self Est.	Fam.	Lik.	Meth.	H. S.	Hear	Vis.	Art.	Hwt.	Temp.	Aca. Gr.	Subject Most	Subject Least	Eng.
1.	J	15 3	G	G	Yes	Sp.	No	G	M	G	P	Even	M	Hist.	Lat.	P
2.	S	15	M	M	No	Mix.	Yes	G	G?	G	P	Nerv.	G	Mus.	Math.	G
3.	S	15	M	G	Ind.	Sp.	No	G	G	G	G	Lazy	M	Sci.	Lat.	G
4.	S	15	M	M	No	Sp.	No	G	M	G	G	Even	M	Sci.	Hist.	G
5.	J	15	M	M	Yes	Mix.	No	M	G	G	P	Nerv.	M	Hist.	Math.	P
6.	J	15	P	M	No	Sp.	No	G	P	G	P	Nerv.	M	Lit.	Lat.	P
7.	J	15	M	M	Yes	Sp.	No	P	P	G	P	Nerv.	M	Lit.	Lat.	P
8.	S	14.5	P	P	No	Sp.	No	G	G	G	M	Even	M	Math.	Lat.	P
9.	S	14.5	M	G	Yes	Sp.	No	G	M	G	P	Lazy	P	Lit.	Math.	P
10.	S	14.5	M	G	Yes	Mix.	No	M	P	G	P	Nerv.	P	Hist.	Sci.	P
11.	J	14.5	G	P	Yes	Sp.	No	G?	P	G	G	Laz.	P	Hist.	Math.	P
12.	J	14.5	P	M	No	Sp.	No	G	G	G	M	Even	M	Hist.	Math.	M
13.	J	14.5	G	M	Yes	Sp.	Yes	G	P	G	M	Even	M	Mus.	Math.	P
14.	S	14	M	M	Yes	Mix.	No	M	M	G	G	Nerv.	M	Lit.	Math.	M
15.	J	13	P	P	No	Mix.	No	G	M	M	G	Lazy	M	Sci.	Hist.	P
16.	J	12.5	P	M	No	Sp.	No	G	G	G	P	Lazy	M	Sci.	Art	P
17.	J	12.5	P	M	No	Sp.	No	G?	M	G	P	Lazy	M	Sci.	Lat.	P
18.	S	12	M	G	No	Sp.	No	G	G	P	M	Even	P	Hist.	Lat.	P
19.	S	11	P	G	No	Sel.	No	M	P	M	P	Nerv.	M	Hist.	Sci.	P
20.	S	10.5	M	G	Yes	Sp.	No	G	P	M	M	Lazy	P	Math.	Hist.	P

TABLE IX c.

SUMMARY OF CASES OF TWENTY BEST AND TWENTY WORST SPELLERS

LIKING	Yes	Indif.	No.	
	18	2		Best Spellers
	9	1	10	Worst Spellers
METHOD	Speller	Mixed	Selected	
	14	4	2	Best Spellers
	14	5	1	Worst Spellers
HIGH SCHOOL	Yes		No	
	8		12	Best Spellers
	2		18	Worst Spellers
TEMPERAMENT	Even	Lazy	Nervous	
	13	1	6	Best Spellers
	6	7	7	Worst Spellers
HEARING	Good	Medium	Poor	
	15	5		Best Spellers
	15	4	1	Worst Spellers
VISION	9	10	1	Best Spellers
	7	6	7	Worst Spellers
ARTICULATION	19	1		Best Spellers
	16	3	1	Worst Spellers
HANDWRITING	12	5	3	Best Spellers
	5	5	10	Worst Spellers
ACADEMIC GRADES	10	8	2	Best Spellers
	1	14	5	Worst Spellers
FRESHMAN ENGLISH	9	8	3	Best Spellers
	3	3	14	Worst Spellers
FAMILY	17	2	1	Best Spellers
	7	10	3	Worst Spellers
SUBJECTS LIKED	Most		Least	
	Literature (11)		Mathematics (10)	Best Spellers
	History (7)		Mathematics (7)	Worst Spellers

1. *Early Training.* There is no clear evidence that it matters one way or another whether the individual has been drilled on the basis of the old-fashioned speller, or brought up on more modern methods, with a selected word list, derived from the day's work. Prolongation of study into the High School, on the other hand, seems to exert a definitely favorable influence; while in the case of certain individuals (notably numbers 9 and 14 of the worst spellers) irregularities in early schooling, such as shortening of the term in the grades, private tutoring, country schools, seem to have been the chief determining factors of deficiency. The fact that 15 per cent. only of the good spellers (as against 65 per cent. of the poor spellers) come from homes in which incorrect spelling is said to be the rule, may

also be considered here, as an indication that bad spelling in one's early home environment is as contagious as bad grammar. The figures would probably be even more striking, if a more reliable estimate of the spelling in the 'poor spellers' families were available.

2. *General Learning Ability.* Ability to spell (as measured by our tests) and general learning ability (as gauged by academic grades) are by no means commensurate, as has been already indicated by reference to their low correlation coefficient (+.42). Such correlation as there is, however, is most evident in the upper and lower reaches of the scale (for spelling ability); 50 per cent. of the best spellers ranking also among the best students, whereas only 5 per cent. of the worst spellers fall in this class. The correlation is somewhat less obvious near the foot of the scale, only 25 per cent. of the poorest spellers falling in the rank of the poorest students, while 10 per cent of the best spellers belong here also. On the whole, however, it will perhaps be found most satisfactory to accept general learning ability as the basic factor in correct spelling, explaining the exceptions and anomalies by reference to peculiarities of early training, of the individual's sensory or motor equipment, or interests (See headings 1, 3 and 4).

3. *Sensory and Motor Peculiarities.* Seventy-five per cent.* of the poor spellers have some defect or other of hearing, vision, or articulation, (one half of them a decided defect, and nearly as many a defect in more than one of these respects), as against sixty-five per cent. of the good spellers, not one sixth of whom have more than a minor deficiency. Most of the visual cases among the former are cases of near-sightedness or astigmatism, either uncorrected in the grades, or corrected with glasses worn with great irregularity in school or college. The bearing of this latter defect upon exactness of orthography may be readily surmised in the light of the fact that for the astigmatic eye black characters upon white seem to dance upon the page and blur, steady fixation or exploration of minute details producing headache which may amount to virtual torture. Vagueness of auditory images, in cases of imperfect hearing, imperfectness of articulatory imagery, where there is an impediment of speech, may be assumed to offer an equal handicap, even when (in the latter case) the articulatory defect does not directly affect the portion of the word most liable to error. In the opinion of the writer, all three conditions conduce to inexactness.

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*The writer suspects that this figure would be even higher if careful eye tests were made on all subjects, notably cases 2 and 3 of the worst spellers, who have virtually nothing against them on our chart as it stands except temperamental peculiarities.

The significance of the fact that 50 per cent. of the poorest spellers (as against 15 per cent of the best) fall in the class of the least legible writers is not so clear. Illegible handwriting may be a contributory cause (of verbal inexactness), or merely a coordinate effect of some more or less obscure factor making for sensory-motor inexactness in general. The same may be said with regard to peculiarities of temperament or disposition.

4. *Interests.* The possibility that handicaps in the way of sensory, motor, or temperamental defects may be effectively counterbalanced by intensive direction of the subject's interest to literary fields is indicated by the cases of 7, 8, 10, and 14, of the best spellers (Table IX A), and by the fact that, on retrial, the scores of those among the poor spellers of the first trial who rated literary studies high almost uniformly took an upward leap. The fact that 55 per cent. of the best spellers declare a preference for literary studies, while 50 per cent. place mathematics at the foot of the list, is significant in this connection,* as are also the correlation coefficients between spelling, and grades in English and mathematics, quoted earlier (Table VI a). These figures would, to be sure, gain in significance if corroborated by the inverse location of these subjects on the lists of preferred studies of 'poor spellers' instead of which we find history at the head, though in no clear majority.

As might perhaps be anticipated, 45 per cent. of the best spellers (as against 15 per cent. of the poorest) took high rank in freshman English; while 15 per cent. of the former, 70 per cent. of the latter, scored with the lowest.

The early liking for spelling itself as a school subject, found most frequently among good spellers (in 90 per cent of cases), seems to be correlated with, or subsidiary to, interest in literary studies in general. In any case, its importance is ambigious, since it is as likely to represent a result as a cause of spelling ability; *i. e.*, it is dubious whether the individual does well in a given subject because he possesses natural ability in that direction and enjoys working in it; or whether, his interests having been directed that way by chance (*e. g.*, by social pressure, or family culture) special effort is exerted along the lines of this subject, and liking follows success or vice versa.

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*It is interesting to note at this point the statement frequently made by grade teachers to the effect that children who do well in spelling and reading usually do poorly in mathematics and vice versa.

VI. Summary

1. There is no evidence of deterioration in the spelling of college students from year to year.

2. Although early habits of error are difficult to overcome, the spelling of adults may be improved with a minimum of effort; indeed, it seems highly probable that the college course represents the most fitting moment for the acquisition of spelling arcs in connection with the majority of the words of the adult vocabulary, *per se*.

3. Correction of sensory defects in early childhood would probably prove as efficacious as improved methods of teaching in eliminating faulty spelling.

4. Direction of interests toward or away from literary studies strongly affects spelling. Interest in mathematics appears to exert an inhibitory influence. Family influences probably operate indirectly here, as reinforcing factors or the reverse, rather than directly through the medium of heredity, *i. e.*, in the opinion of the writer, the 'born speller' (and his opposite) is a myth.

5. Correlation between spelling ability and general ability, while positive, is not so striking, as that between spelling ability and certain factors making for general accuracy and exactness.

'BRIGHT' AND 'SLOW' PUPILS IN ELEMENTARY AND HIGH SCHOOL*

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The investigation here reported set out to answer the following questions:

(1) What per cent. of "Bright" pupils in the high school were "Slow" in the "Early" grades?
(2) What per cent. of "Slow" pupils in the high school were "Bright" in the "Early" grades?
(3) If such cases are found, what explanation can be offered for such change in the standing of these pupils?
(4) Other minor questions, such as may arise in connection with the study, with reference to progress and elimination.

Before proceeding with the investigation it was first necessary to define the terms "Bright" and "Slow," and to set the limitations of the terms "Early" and "Late," as applied to entrance to school. For the purpose of our study, the dividing line between "Early" and "Late" entrance was placed at the end of the fifth grade. Thus all the pupils who entered in the fifth grade or earlier were classed as "Early" entrants and all who entered in the sixth grade or later were classed as "Late" entrants.

It was decided to class the upper quartile of each group investigated as "Bright" and to class the lower quartile as "Slow." This involved the adoption of some system of ranking the pupils in respect to their scholarship. The only source of information available consisted of a set of high school record cards, on which were recorded the marks given by the teachers and a set of elementary record cards containing the teachers' estimate of the pupils. The high school marks were reported six times each year for each subject taken and in some cases twice for each subject, as for example, English, for which two grades were sometimes recorded, one being for composition and the other for literature. Two grades were sometimes found in the case of Latin and a few other subjects. The

* A study of the records of 116 graduates and 184 non-graduates for the years 1913-14 to 1916-17, inclusive, who attended the Ethical Culture School, of New York City.

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system of marking used was as follows: A equals very good—90 to 100%; B equals good—75 to 90%; C equals passing—60 to 75%; C— equals not passing—condition; D equals failure. Effort is shown by the use of a plus mark and lack of effort by the use of a minus mark. (In the case of C— lack of effort is shown by an additional minus mark.) The elementary record cards were regularly handed in several times each year and more often as occasion might require. For a pupil who entered the kindergarten and continued on through the high school to graduation, there were as many as 150 to 200 of these cards on file. While these are called elementary record cards, it appears that similar cards are turned in by the high school teachers, so that the complete report for each pupil from the time of entering the school to the time of leaving is found in one file, with the exception of the *marks* received in high school. There were also found incomplete grade cards for the years below the high school. There appeared to be an inverse correlation between the scholarship rating of any given pupil and the number of report cards turned in, *i. e.*, the higher the standing, the fewer the number of cards and the lower the standing, the more cards were turned in by the various teachers all the way through the grades and the high school.

As a basis for ranking the pupils it was decided to use a method of weighting the marks received in high school and check this rating by comparing it with the judgment of the teachers as found on the report cards. The following formula was devised for the evaluation of the marks received in high school:

$$\text{S. Q.} = \frac{3A+2B+C-D}{A+B+C+D} \text{ in which}$$

A, B, C, and D represent the number of each mark received, respectively, and S. Q. represents the 'Scholastic Quotient' sought. This quotient has a range of from minus 1 to plus 3. In the accompanying table a few of the more representative values are shown in terms of the relative proportion of each mark necessary to yield the given quotient. The highest possible quotient, of course, is when all the marks received are A's and the lowest possible quotient is when all the marks are D's. The number of marks received does not alter these limits, since the same result is obtained with one mark or with a thousand and one. There are numerous possible combinations of

Limits of range of Q.'s are—1.00 & 3.00

3	00	Al	A			
2	50	Equa l No.	A	B		
2	00	Equal No.	A	B	C	
2	00	All		B		
2	00	Equal No.	A		C	
1	50	Equal No.		B	C	
1	25	Equal No.	A	B	C	D
1	00	Equal No.	A			D
1	00	All			C	
	67	Equa l No.		B	C	D
	50	Equal No.		B		D
0	00	Equal No.			C	D
— 1	00	All				D

the four marks that would produce various degrees of the quotient, ranging theoretically from the highest, or plus 3.00 to the lowest, or minus 1.00.

It should be pointed out in this connection that the use of this formula assumes an equal weight for all the subjects for which marks are given. For this reason we should expect some cases in which, for example, a pupil would be placed in the class of "Bright" high school pupils because of a high S. Q. and at the same time be rated very much lower by the combined judgment of the teachers. This discrepancy would be explained by the fact that the most of the high marks received might conceivably be in subjects such as art, shop, or physical training, which are not reckoned as contributing as much toward scholarship in this particular school, as do the other subjects. Such a case is that of girl No. 6 of the class of 1914-15, who shows the very high S. Q. of 160. This places her in the upper half of the

middle 50 per cent of a group of 64 graduates, who entered "Late." As a matter of fact, however, 11 of the 15 A's received were given in the subject of physical training.

This raises the question of what subjects furnish the best criterion for estimating scholarship and hence the best basis on which to predict success or failure in life. The answer to this question very naturally depends upon the kind of success in life one has in mind. If success in life means to become a successful teacher of Latin or Greek, or any other language for that matter, manifestly the only persons who will ever be successful are those who master the languages which are to be taught. So, also, if success in life means to attain a high degree of prominence in some vocation, which involves the use of higher mathematics, manifestly those who are to be counted as successful must master higher mathematics. Or, again, if success in life is interpreted to mean the passing of college entrance examinations and the completion of a classical course in some institution of higher learning, it goes without saying that success in life can be predicted by success or failure in the same subjects in the high school. But, if it is allowed that a millionaire broker, or manager of a great manufacturing concern, or a manager of a big league base ball team, or a president of a great banking concern, or a big wheat farmer, or a cattle raiser on a large scale, or the mayor of a great city, or the promoter of some great philanthropic enterprise, or any one of a hundred and one other persons of similar influence and prestige has made a success in life, then the best criterion for estimating scholarship and the best basis on which to predict success in life might conceivably be one's ability to "get by on a pony" in the Latin class, or one's ability to excell in managing college athletics for a season, or even the ability to get others to do the work that one is supposed to do himself. So, also, if success in life is interpreted to mean the becoming of a great painter or sculptor, manifestly aptness in art work and in clay modeling is a better basis on which to predict success than either language or mathematics. Indeed it may be said at the present time that the ambitions of the majority of our brainy young men who enter the high school lead them into fields of endeavor in which little of higher mathematics is wanted and almost none of any kind of foreign language, not to mention the *dead* languages.

For this particular school, however, in which one of the chief purposes is to prepare for college entrance examination in colleges which still persist in requiring a certain formal knowledge of language

and mathematics, together with English literature and a few closely allied subjects, the scholastic standing of the pupils must necessarily be based chiefly upon achievement in these subjects. Even so, there were found only a very few cases in which the rank of a given pupil as based on his S. Q. was markedly different from that given him by a consensus of the teachers' judgments as found on the report cards. There is an almost perfect correlation between the rank of the pupils as determined by the S. Q., as calculated by the above formula, and their rank as determined by an averaging of all the reports made by the teachers.

In the course of our investigation the following facts were brought to light, some of which may have a significant bearing upon certain problems arising in connection with the administration of a private school of this kind in a community like New York City.

The period of time chosen for our investigation comprised the years 1913-14 to 1916-17, inclusive. During this period there were 116 pupils who graduated from the high school, and 184 others who advanced as far as into the eighth grade, in line for graduation in one or another of the four classes, but yet who failed for various reasons to complete the course. Of the 116 graduates 40, or 34 per cent, were boys and 76, or 66 per cent, were girls. Of the 116 graduates there were 16 boys and 36 girls who entered "Early," *i. e.*, before the end of the fifth grade. That is to say, 40 per cent of the boys and 47 per cent of the girls who graduated entered "Early." The records for the four years show a gradually decreasing per cent of graduated boys who entered "Early." The figures for the four years are 44, 43, 40 and 29 per cent. Just the reverse is true in the case of the girls, the per cents being 12, 48, 53 and 53 for the four years, respectively. The increase in the per cent of girls entering "Early" exceeds the decrease in the case of the boys, so that when taken together there is an increase in the per cent. of pupils graduating who enter "early." When combined the per cents are 29, 46, 48 and 49 respectively, for the four years.

As noted above there were, during this same period, 184 pupils who advanced into the eighth grade, in line for graduation in one of the four classes, but who failed to complete the course. Of these 65, or 35 per cent, were boys and 119, or 65 per cent, were girls. Of the 184 non-graduates there were 23 boys and 24 girls, who entered "Early." That is to say, 35 per cent of the non-graduate boys

entered "Early," as against 40 per cent of the graduate boys and 20 per cent of the non-graduate girls entered "Early" as against 47 per cent of the graduate girls. From these data we have calculated the following expectation on the basis of 100 entrants and also the requirements in terms of entrance in order to insure an out-put of 100.

Of every 100 boys who enter "Early" 41 will graduate and 59 will not. Of every 100 boys who enter "Late" 36 will graduate and 64 will not.

Of every 100 girls who enter "Early" 60 will graduate and 40 will not. Of every 100 girls who enter "Late" only 30 will graduate, the other 70 will not. That is to say, of every 100 pupils who enter "Early" 52 are boys and 48 are girls, and of every 100 pupils who enter "Late" 32 are boys and 68 are girls.

That is, if we feed in 100 pupils "Early" and 100 "Late" as they usually come to this school, we may expect 84 of them to be boys and 116 to be girls. We may expect 33 of the 84 boys to graduate and 49 of the 116 girls to graduate.

Or, if it is desired to turn out, say, 100 graduate boys each year, 244 "Early" entrants must be fed in, or 278 "Late" entrants. Or, if the classes are such that it is desired to have an equal number of boys entering "Early" and "Late," it will be necessary to provide 129 of each class, or a total of 258 pupils.

If it is desired to turn out 100 graduate girls each year it will be necessary to feed in 167 "Early" entrants, or 333 "Late" entrants. Or, if it is desired to admit an equal number of "Early" and "Late" entrants the number needed of each class will be 111, or 222 altogether.

The average length of time spent in the grades by the 116 graduates was 6.7 semesters and the average length of time spent in the high school was 7.7 semesters. The average length of time spent in the grades by the 184 non-graduates was 4.61 semesters and 3.8 in the high school. The graduated girls spent on an average 1 semester more in the grades and 1.7 semesters more in the high school than the graduated boys.

Of the non-graduates, the boys spent a slightly longer time both in the grades and in the high school than did the girls. This means that as a rule, in this particular school, the boys who graduate either advance through the high school more rapidly than the girls, or there

are more boys who enter higher up in the high school. The probability is that both these factors operate to make the difference shown in the length of time spent. Referring to our previous statement regarding the per cent of pupils entering "Early," the above supposition is shown to be true, for 60 per cent of the boys who graduate enter "Late" and only 53 per cent of the girls who graduate enter "Late."

Coming now to our main problem, we find that *there were no cases presenting any marked change from "Bright" to "Slow," or vice versa.* as they passed from the "Early" period in the elementary school to the high school, in either the graduate or the non-graduate group. The following procedure was carried out, however, which yielded valuable data for general reference and for the study of certain other specific problems, as that of individual differences in school achievement, as based on sex, age, physical condition, the comparison of teachers' marks in the different subjects in the high school and the relative change in marks from year to year, etc.

The information contained on the high school and elementary record cards was tabulated, in convenient form in a note book after the following manner: A separate tabulation was made for each graduating class, boys and girls separate, from the year 1911-12 to 1916-17, although only the last four years of this period were used in the calculations here presented. The tabulation contained, first the name of the pupil, then the date of entrance and the class entered, the time spent in the grades and in the high school, when graduated, *i. e.*, whether in February or June, standing in the grades and in the high school in terms of "Bright," "Average," or "Slow," the number of each kind of mark received, the S. Q., and finally a distribution of thecases in which he received high marks (A's) and low marks (C-'s and D's) in the various subjects. All the subjects offered in the high school curriculum were grouped into the following eight groups, viz.: English, Modern Language, Ancient Language, Mathematics, Science, Arts, Shop, and Physical Training.

The 52 graduates, who entered "Early," were then arranged in the order of their S. Q. from the lowest to the highest. The S. Q.'s for the whole group ranged from .75 to 2.49. This means that the poorest member of the group is about equal to a student who receives an equal number of B's, C's and D's, and no A's, while the best member of the group is about equal to one who receives an equal

number of A's and B's, with no grades lower. The lower quartile (13 pupils) includes those whose S. Q.'s range from .75 to 1.24, *i. e.*, from the poorest, as described above, to a pupil about equal to one who receives an equal number of all four marks. The lower half of the middle 50 per cent (the second quartile from the lowest) includes the 13 pupils whose S. Q.'s range from 1.24 to 1.54. Thus this group ranged from a pupil about equal to one who receives an equal number of all four marks to one who receives an equal number of B's and C's, with no marks higher or lower. The upper half of the middle 50 per cent (the third quartile from the lowest) includes the 13 pupils whose S. Q.'s range from 1.54 to 1.90. That is from a pupil about equal to one who receives an equal number of B's and C's, with no marks higher or lower, to one who receives all B's, or an equal number of A's, B's and C's, with no D's. The upper quartile, classed as "Bright," include the 13 pupils whose S. Q.'s range from 1.90 to 2.49. The range of this group is thus from a pupil about equal to one who receives all B's, or an equal number of A's, B's and C's and no D's, to one who receives an equal number of A's and B's and no mark lower. We have, therefore, 13 "Bright" pupils, 26 "Average" and 13 "Slow" ones.

An examination of the more than 4,000 report cards for the 13 "Bright" and the 13 "Slow" pupils showed a very close correspondence between the rank as determined by the S. Q. and the rank as based upon the consensus of opinion of all the teachers. If the rank of any given pupil, as based upon his S. Q., is discussed with any given teacher, the individual judgment of said teacher will naturally differ from the S. Q., according as that particular pupil happened to be one who was 'good,' or 'poor' in the particular subject taught by that teacher. But if the consensus of opinion of all the teachers is taken as a basis for rating any given pupil, *no case was found in which a pupil, who was characteristically "Slow" in the "Early" grades, changed so as to be characteristically "Bright" in high school, or vice versa.*

The following two reports, one for a typical "Bright" pupil and the other for a typical "Slow" pupil, represent fairly well the characteristic remarks found on the report cards. The Roman numerals represent the grades from the time the pupil entered the school until the completion of the eighth grade and the capitals represent the four years of high school, which are designated as Alpha, Beta, Gamma and Delta, respectively.

(1) Excerpts from record cards of pupil No. 48, who ranks 9 in the uppermost quartile (The "Bright" group) and whose S. Q. is 2.18.

I. Bright—Capable—Active—Keen—etc.
II. Capable—Older—Serious—Thinks clearly—First impression is of brighter mind than he really is—etc.
III. Bright—Responsive—All round satisfactory.—Right in front rank, yet not above his grade—etc.
IV. Not of manual and mechanical type—Future?—Remarkable reasoning power—Great accuracy and care—etc.
V. Splendid in every way, but lacks in ability to execute with hands—(Very naturally this was taken from a report card handed in by the teacher of manual training.)
VI. Normal—A model—Satisfactory—Keen mentally—etc.
VII. Serious—Excellent—etc.
VIII. Similar reports—etc.
A. Emminently satisfactory—etc.
B. Scholarly qualities—Good worker—Fights against fault of 'Scatterbrainedness'—etc.
G. Typical plodder—Average ability—Steady serious boy—etc.
D. Conspicuous for good scholarship—etc.

(2) Excerpts from record cards of pupil No. 6, whose rank is 6 in the lower quartile (The "Slow" group) and whose S. Q. is .96.

V. Unstable—Inattentive—Changeable—Not very strong—Pass—
VI. Shows improvement—Satisfactory—Careful, but slow—etc.
VII. Long absence—Above average in ability, but below in accomplishment—Lives far out—
VIII. Absent much—Makes excuses—Passing—etc.
A. Average ability—Not strong physically—Easily confused—Tries hard when spirit is good—Lazy?—etc.
B. Failing in Latin and Mathematics—Similar weakness in brother—Lacks application—etc.
G. Reached limit in mathematics—Repeats in Latin, which seems good—
D. Barely passing—Good girl, but weak in scholarship—etc.

In interpreting these reports it should be borne in mind that the pupils who graduate from this school, as a rule, are those who are able to meet the minimum requirements in some, if not all, of the so-called 'heavier' subjects, viz.: language, mathematics, English and science. Moreover, it should be remembered that more of the pupils take these subjects than take the 'lighter' subjects, except in the case of physical training, which is required of all, unless excused by the authorities for physical reasons. Thus it is quite possible for a pupil to attain very high rank in scholarship and at the same time

be reported upon as 'Incapable, Not dexterous, or even possessed with faults' by the teachers of the lighter subjects.

On the other hand, it should be kept in mind that these samples were taken from a group of 52 pupils, all of whom entered "Early" and persisted with at least a passing grade, otherwise they could not have graduated. Thus in case of the "Slowest" of the "Slow," remarks, such as 'Passing, Satisfactory, and the like,' would naturally be found.

As indicated above, a tabulation was made of all the cases in which high marks (A's) and low marks (C—'s and D's) were received by the 116 pupils who graduated from the High School during the period studied, viz.: the years 1913-14 to 1916-17, inclusive. The following is a summary of these data:

	1913–14				1914–15				1915–16				1916–17			
Subj.	Boys		Girls		Boys		Girls		Boys		Girls		Boys		Girls	
	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L
Eng.	5	1	3	2	4	4	8	2	2	4	5	3	2	1	13	10
M. L.	4	2	5	1	4	7	16	5	4	2	10	4	1	4	10	13
A. L.	3	–	1	4	3	6	6	4	1	5	4	6	–	4	4	19
Math.	3	5	–	7	4	7	3	13	–	10	1	11	1	2	3	22
Sci.	3	2	3	4	3	8	9	4	4	2	6	6	2	1	6	12
Arts	2	–	5	1	3	1	8	3	2	–	6	1	2	–	14	2
Shop	2	–	–	–	1	1	–	1	3	1	–	–	3	–	–	–
P. T.	4	1	1	–	2	–	7	–	3	–	6	–	2	–	19	2
Total	26	11	18	19	24	34	57	32	19	24	38	31	13	12	69	80
For yrs.	H–44		L–30		H–81		L–66		H–57		L–55		H–82		L–92	

Summary for the 4 years.

Subj.	Boys		Girls		Boys & Girls	
	H	L	H	L	H	L
Eng.	13	10	29	17	42	27
M. L.	13	15	41	23	54	38
A. L.	7	15	15	33	22	48
Math.	8	24	7	53	15	77
Sci.	12	13	24	26	36	39
Arts	9	1	33	7	42	8
Shop	9	2	–	1	9	3
P. T.	11	1	33	2	44	3
Total	82	81	182	162	264	243

The above is not a tabulation of the number of *A's and C-'s and D's* received, but a tabulation of the number of *cases*, in which a pupil received either of these marks. For example, in the class of 1913-14, of which there were 9 boys and 8 girls, there were 26 cases in which A's were given to boys and 18 cases for the girls; there were 11 cases in which boys received C—'s or D's and 19 cases for the girls. For the whole class there were thus 44 cases in which high marks were received and 30 cases in which low marks were received. The summary for the four years shows that there were an almost equal number of cases in which both high and low marks were received by the boys. In the case of the girls, the number of cases in which high marks were received is approximately one eighth more than the cases in which low marks were received. Considering the boys and girls together for the four years there are about one eleventh more cases in which high marks were received than in which low marks were received.

By dividing the number of cases in which high marks were received through by the number of cases in which low markswere received. The ratios thus obtained give us a fair picture of the relative difficulty of each subject, arranging the subjects in the order of these ratios from the highest to the lowest, we have the following array:

Physical Training	14.67
Arts (Dom. & Fine)	5.25
Shop (Man. Tr., etc.)	3.00
English & History	1.56
Modern Language	1.42
Science	.92
Ancient Language	.46
Mathematics	.19

Thus there appears an almost perfect gradation all the way from the subject which is almost wholly a matter of ideo-motor coordination to the subject which involves the largest amount of abstract thinking. The only possible exception is that of ancient language, which should, no doubt, have occurred in the array following modern language. Allowing the facts displayed by this table to stand as they are, the question still might be raised as to the consistency of the standards set up by the various departments. For example, it might be asked, why one subject, as physical training, should be given in such a way that there would be 14.67 times as many cases in

which pupils receive high marks as the cases in which low marks are received, and another subject, as mathematics, be given in such a way that only one fifth as many cases occur with high marks as occur with low marks.

There are three possible ways by which the relative per cent of high and low marks may be made practically the same for all subjects taught. (1) By being more liberal in marking in the case of those subjects which show the lower ratios and by being more exacting in the case of those subjects which show the higher ratios in the list given above. (2) By introducing more difficult subject-matter, in the case of subjects showing high ratios and less difficult subject-matter, in the case of the subjects showing the lower ratios. And (3) by adopting a system of ranking the members of each class from the best to the poorest, using all available information as a basis for such ranking, and then distributing the marks according to a curve approximating that of the normal surface of frequency. Either one of these methods would result in an array of ratios, for all the subjects, varying but slightly either way from any ratio that might be chosen as the most desirable ideal.

In our opinion, the thing that should be done is to combine methods (2) and (3) in all cases where there are as many as 50 pupils in a subject (theoretically there should be at least 100), and with due allowance for exceptional cases in which the selection of pupils in the class is other than random.

A SCALE FOR THE INDIVIDUAL MEASUREMENT OF READING ABILITY

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Experiments in the psychology of reading have shown very strikingly the close relationship between the face or form of the printing type and its legibility (3,11). The total character of the words, the breadth and height and geometrical form of letters, the width of line of the letter, the extent of white margin around the letter, the length of line and space between lines—all condition the legibility of the printed page and, ergo, the reading speed and comprehension. But in the literature of educational measurements but little attention has been paid to this important factor in tests of reading ability. The legibility of the printed page conditions so directly the reading speed that it should not be neglected in the construction of any scale for measuring the reading ability particularly of school children.

In the present reading scale, the factor of degree of legibility has been carefully worked out with a view to making the mechanical conditions of the tests as near the optimum as possible.

The need for standardized reading tests which could be used in the examination of public school children for the special classes was apparent to the writer in connection with the mental examination of such children. In the fall of 1917 under the direction of Dr. F. Kuhlmann at the Minnesota School for the Feeble-Minded, the writer undertook a study of the three R's ability of subnormal children (6). In the course of that study, the present reading scale was constructed to meet the needs of the individual examination which the extant group reading tests failed to supply.

PSYCHOLOGICAL REQUIREMENTS IN PRINTING OF READING SCALE

In the present reading scale an attempt was made to determine for children of the various grades the reading rate and conditions affecting it. Important among these conditions is the child's manner of perceiving words, which depends largely on how he is taught to perceive them. The reading rate of children of the first grade was found to be almost wholly dependent on the manner of training. That method which emphasizes the apprehension of the whole idea

before beginning to read the sentence aloud, while an almost insuperable obstacle to the measurement of oral reading speed in the first grade, yet seems to show a rapid increase in the lower grades with the attainment of an early maximum reading speed. The child in the first grade has not yet acquired that "fore-boding of the coming grammatical scheme," which James says accompanies reading aloud, and hence often hesitates long before he perceives that "once there was a little girl....!" His silent reading is almost always of the motor type; the early reading of children is universally with the lips moving (9), and there is but little difference between reading silently and reading aloud.

Of first importance in the reading rate, especially for children of the upper grades, is the type used. In a study of the legibility of different faces of printing types (11), Roethlein tried out experimentally some fifty faces of ten point type. These investigations showed News Gothic, Cushing Oldstyle, and Century Oldstyle to be the most legible faces where letters were grouped. In so far as legibility alone is a criterion of excellence in type face, News Gothic would be preferable. Other considerations, however, must be taken into account in selecting a suitable type face for reading. News Gothic has the disadvantage of being an unfamiliar face, bold and unusual in design and character and better adapted for display type. By its very unfamiliarity its usefulness as a reading type for children is limited. Its use is rendered further impractical by its being ill-adapted to the twelve, fourteen, and eighteen point sizes necessary for the various grades. Cushing Oldstyle is similarly ill-adapted for use in the fourteen and eighteen point sizes because one of its distinctive features is a certain heaviness of face which is the result of the thickness of the downward stroke of the letter and while it adds to the legibility of the letter in the ten point type, it renders eighteen point practically useless for reading type.

Century Oldstyle remains, on the whole, by far the most desirable from the standpoint of all practical considerations of legibility. It has the distinct advantage of being a familiar face, undistinguished by any peculiarities of shading or unusual letter forms, such as, for instance, the Cheltenham G. It conforms to the requirements for legibility in form of letter, size of letter, width of line of letter and extent of white margin around the letter. Increased heaviness of face increases legibility only to a certain point, after which legibility

decreases; broadening the letter form increases the legibility up to a certain point and also increased thickness of line until an optimal thickness of line is reached after which legibility decreases (11).

The size of type to be used for the various grades has been discussed by Huey and Shaw (3, 12) but, to my knowledge, no very extended experiments as to the exact size and kind of type best adapted to the various grades, have been made. Huey, following Shaw's studies, suggests for first grade a minimum size of type[1] of 2.6 mm. with a minimum leading of 4.5 mm.; for grades II and III a type minimum of 2.0 mm., leading 4.0 mm.; for grade IV minimum size type should be 1.8 mm., leading 3.6 mm.; and for grades beyond IV, type and leading should be kept well above the minimal adult requirements. The following table shows the various sizes of the Century Oldstyle type, ten, twelve, fourteen, and eighteen point and the standard requirements in so far as they have been determined.

Table I

	10 point		12 point		14 point		18 point	
	Stand.	Cent.	Stand.	Cent.	Stand.	Cent.	Stand.	Cent.
Size of type	1.5	1.75	1.8	2.0	2.0	2.5	2.6	3.0
Thickness of stroke	.25	.25	–	.3	–	.4	–	.5
Space within letters	.3	.75	–	1.0	–	1.25	–	1.5
No. of letters per cc.	6–7	5–6	–	5–6	–	4–5	–	3–4
Leading	2.5	3.0	3.6	4.0	4.0	5.0	4.5	6.5
Length of line	90–	85.0	–	85.0	–	90.0	–	90.0

In every case the size of type is well above the standard minimum requirement. Leading, the space between lines, has been adjusted to the optimal distance, *i. e.* For ten point type 2.5 mm. is the minimum requirement, but 3.0 mm. is preferable. Thickness of vertical strokes, space within letters (between vertical strokes) and number of letters per running cc. have been standardized for ten point type only.

Requirements for length of line have been very carefully worked out by Dearborn and others (1). Lines of moderate length facilitate speed and ease of reading by lessening the amount of work that the eye must perform in moving from one fixation point to the next.

Footnote 1. Size of type in this discussion means height of lower case letter measured from top to bottom of letter without projections.

Dearborn favors lines from 60 to 80 mm. in length with a maximum of 90 mm. And Huey (3) affirms that "a book should not be used whose lines are more than 90 mm.!" The length of line is relatively of little or no importance for first and second grade readers because the child is concerned almost entirely with the recognition of words and their assimilation into his already acquired "meaning consciousness." Which process has not yet become a habit. With the other grades, however, the length of line is very important indeed, not only from the standpoint of increasing reading speed, but also because it is very important that the child should early acquire the proper reading habits even in the accommodation of eye movements to a sort of "rhythmical regularity" (1) which increases both "speed and ease of reading." Accordingly the length of line for grades I and II and III has been made 90 mm. while for grades IV and V and VI has been fixed at 85 mm. which is well within the maximum of 90 mm.

Century Oldstyle has thus approximated as nearly as possible the ideal mechanical requirements of reading type. Under such conditions it was to be expected that the elimination of all impediments of mechanism would in itself facilitate reading speed. The results seem to confirm this conclusion strikingly.

Method of Procedure

In the standardization of the reading scale, preliminary norms were found, and selection of reading passages made from the examination of the first seven grades in the Faribault public schools.[2]

The object of the present investigation was to standardize reading tests which could be used to determine the reading ability of children, especially in connection with the mental examination. The scale consists of three selections for each of the first six grades.[2a] The scale measures reading ability only as far as the sixth grade for two reasons. In the first place "few feeble-minded children of even the highest type ever do more than fifth grade work successfully. . . ." (2) Subnormal children "show an increasing inability to maintain

Footnote 2. The writer is indebted to Supt. John Monroe and the teachers of the Faribault schools for their courtesy and hearty co-operation in these experiments. We are under obligations, also, to Supt. W. B. Thornburgh of the Owatonna public schools for data on tests of second and third grade children.

Footnote 2A. Owing to limitations of space the selections of the scale cannot be printed here. Anyone who wishes to purchase a copy of the scale may apply to the writer at Faribault, Minn.

the standard that their grade of intelligence would lead one to expect." (6) In reading they attain only 75 per cent. of what they are expected to for their mental age. In an examination of special class children of Detroit, Dr. Renshaw found 86 per cent. below third grade level in reading. (10) These considerations indicate that a reading scale extending as far as grade VI amply fulfills the requirements for such measurements.

In the second place and of much greater importance, is the fact that grade VI seems to mark the upper limit of practical value for an oral reading scale. Huey (3) found average adult silent reading speed to be 2.08 words per second faster than oral reading. Pintner and Gilliland (8) found that even for fifth and sixth grades silent reading showed a slight increase in "reading value," while for third and fourth grades the reading value for both silent and oral methods was the same. Above the sixth grade, however, an increasing reading value was assigned to the silent reading.

The present tests are more directly comparable with Starch's results (13, 14, 15) whose method I have used in expressing reading rate in number of words per second and whose group selections I have standardized as individual tests together with other selections of similar degree of difficulty. My tests show a large increase in reading rate from first to second and second to third grade, with a relatively smaller increase from fourth to fifth and from fifth to sixth, while the increase in silent reading rate (Starch tests) is greater in the upper grades. (cf. Table II). The increase in the silent reading rate in the lower grades is probably due to the difference in the procedure; in silent reading the child will skip a word whose meaning is not known and will in marking the place where he stopped reading (which procedure was used to measure reading speed) be influenced by conditions affecting group tests and will therefor be relatively inaccurate. The examiner cannot, of course, control the conditions of a group test as he can those of an individual examination. It is probable that there is very little difference between the silent and oral reading rate of children of the first grade.

The selections for the scale were made empirically on a basis of comparison with the Starch reading selections (12). Preliminary tests were made only within two months of the beginning of the school year or within two months of the end of the school year. (The final norms are all October scores.) Cases for examination were selected

originally according to age and proper placement in the grade. Only cases within two months of a birthday were examined and only those properly placed in the grade, *i. e.* Eight year olds at the end of second grade were called properly placed in grade II; seven year olds at the beginning of second grade were called standard for first grade, etc. From among the children thus selected, only those were chosen whose school standing in reading was average. This standard of selection proved entirely unsatisfactory not only because it eliminated so many children that there were not enough left, who were available, to establish norms but also because it did not accomplish the object of the selection. Many children in the grades who were either over or under age for the grade were yet doing perfectly satisfactory reading for the grade in which they were placed. Children were then selected on the basis of ability to do satisfactory reading for the grade according to the teacher's judgment. This standard proved much more satisfactory. In the preliminary trials at least six passages were used for each grade. The tentative selections were type written and it is interesting to note in this connection that Roethlein (11) found the American Type-writer face to be the least legible of the types of her investigation. From these six passages were selected for each grade three which showed a maximum and fairly uniform improvement from one grade to the next. These selected passages were then printed according to the requirements indicated and given to children selected as before on the basis of their ability to do satisfactory reading for their grade. All of the preliminary tests were given by the writer. The child was, in each case, given a selection to read and told, "I want you to read this just as fast as you can and just as well as you can." The time was taken with a stop watch and he was allowed to read for sixty seconds. Errors were recorded as follows:

1. Mispronunciations, which indicate unfamiliarity with the word.
2. Substitutions, of another word for the word of the text.
3. Omissions, words left out.
4. Ignoring punctuation marks, indicating lack of comprehension of the text.
5. Hesitations of ten seconds. (If the child hesitated over a word, at the end of ten seconds the examiner pronounced the word for him, recorded the hesitation, which is counted as an error,

and then added ten seconds to his reading time thus insuring that the actual reading time for each selection should be sixty seconds.)

At the end of sixty seconds the number of words read was recorded and the reading rate, in terms of number of words read per second.

The error score has been used rather than any method involving the reproduction of the thought of the selection as an index of comprehension because this method seemed to offer the advantage of being more objective. Without entering into a discussion as to the aim of reading, the attainment of which can be measured only by the correct reproduction of the meaning of the text, we have considered the mental age of the child examined the index of his mental capacity. His reading rate, then, and the number of errors that he made on a selection of known difficulty, were taken as the index of his *acquired* reading skill. It is, of course, true that the child's ability to comprehend the selection directly affects his reading rate and the number of errors that he makes. Quantz (9) found that rapid readers were 37 per cent. superior to slow readers in comprehension. The same is more obviously true of children who have not yet acquired that automatic reading facility which enables the adult reader to proceed with a minimum of consciousness.

The norms, as stated, are all based on October scores. First grade passages were read by children just beginning second grade because it was found that during the first few weeks of school they had had a chance to regain whatever they had lost during the summer vacation months and at the beginning of the second grade represented a completed first grade case. When it came to giving the beginning seventh grade children the sixth grade passages which they had just completed, we found that a new factor of selection entered owing to the fact that in the school system where the tests were tried most extensively, the Junior High School plan was followed, thus widening the gap between sixth and seventh grades. There were fewer poor seventh grade children than sixth, as the promotion from grammar school to high school eliminated many of the poorer pupils who had been pushed on from fifth grade but were not promoted farther.

The tests were given by teachers who knew the children, thus eliminating the possible factor of timidity before a stranger which might influence the brief period of the reading test. The teachers were given careful oral and written instructions and had been pre-

viously trained in the Binet procedure. Given in this way, it was possible to complete the individual examinations during the early part of October.

Results. Table II shows the average number of words read per second by grades, when the selections used were type-written and the increase in number of words read per second when the same selections were printed in Century Oldstyle type according to the standard requirements. The increase in reading rate is very significant in view of the fact that it is consistently greater for each grade.

TABLE II

Increase in reading rates.

Grade	Preliminary (type written)	Final (Cent. O. S. type)
I	1.06 words per second	1.08 words per second
II	1.42 " " "	1.51 " " "
III	1.85 " " "	2.05 " " "
IV	2.16 " " "	2.31 " " "
V	2.44 " " "	2.63 " " "
VI	2.73 " " "	2.81 " " "

Table III shows the increase in reading rate from one grade to the next. Smoothing gives a rate of 1.1 words per second for first grade, 1.5 for second grade, 1.9 for third grade, 2.3 for fourth grade, 2.6 for fifth grade and 2.8 for sixth grade. In determining the reading rate for first grade, the examiner was confronted by the difficulty of overcoming the tendency of some of the chidren (due to the manner of training) to read the sentence silently before reading it aloud. This procedure often took for one sentence more time than was allowed for the entire passage. The child was asked to read it aloud as he went along without waiting to read it to himself first and when this was not successful another method was used[3] but it necessitated omitting the results from one school, for the purposes of the present report, because the results obtained with the alternative method were found to be not strictly comparable.

Foot note 3. This alternative method used for first grade only consisted in determining whether or not the child was familiar with the words of the text. The examiner pointed to the word and the child pronounced it. If the word was unfamiliar or a mistake was made, the examiner allowed a pause of ten seconds before pronouncing the word for the child. The reading time for the passage was taken and the reading rate found by determining, as before, the number of words read per second

Table III

Grade	I	II	III	IV	V	VI
Average	1.08	1.51	2.05	2.31	2.63	2.81
Median	1.05	1.48	2.03	2.27	2.64	2.82
Aver. Dev.	.37	.42	.43	.41	.43	.42
Range	.23–2.7	.37–3.1	1.1–3.6	.93–3.9	1.3–4.0	1.6–3.7

Fifty-eight children were selected for the final norms for first grade; the norms for second grade are based on the examination of sixty-eight selected children; for third grade fifty cases were selected; for fourth grade thirty-seven cases were selected; for fifth grade thirty-seven cases were selected; and for sixth grade there were twenty-two selected cases. Though the number of cases is small they were carefully chosen and we have a double check on the results obtained, by a comparison with Starch's[4] silent reading results and with the preliminary reading rates of the present series.

Beyond fourth grade the increase is not so great in oral as in silent reading. The silent reading speed shows an increasing ratio while in oral reading the speed is already approaching the normal speed for adult readers. Huey (3) found the normal oral reading speed for adults to be from 2.2 to 4.7 words per second. The range of oral reading rates for children in the sixth grade is from 1.6 to 3.7 words per second.

Table IV shows the error scores for the six grades and the relative importance of the various sorts of errors. Errors consisting of omitting words in reading and of ignoring punctuation marks seem to be of the least importance. Errors of mispronunciation and substitution occur with greater frequency, and the range of such errors is much greater. The average total error score for each grade (found by taking the total number of errors of all sorts for each selection) shows great irregularity. If the average number of errors for each grade were constant, then the increasing error score would be due merely to the greater number of words read. However, the score increases from 4.40 to 7.33 from third to fourth grade, then decreases to 7.00 in fifth grade and drops again to 4.05 in sixth grade. The

Foot note 4. (13) Starch's silent reading rates are 1.5 words per second for first grade, 1.8 words per second for second grade, 2.1 for third grade, 2.4 for fourth, 2.8 for fifth, and 3.2 for sixth grade.

decrease in errors in grade VI is probably due to the fact that the children beginning seventh grade who took the test were more highly selected in as much as they had been promoted from grammar school to junior high school.

Table VI

Error score by grades

Errors	I			II			III			IV			V			VI		
	Aver.	Med.	Range	Aver.	Med.	Range	Aver.	Med.	Range	Ave.	Med.	Range	Aver.	Med.	Range	Aver.	Med.	Range
Mispronunciation	.8	1	0–5	1.5	1	0–8	1.	1	0–8	3.5	3	0–10	2.6	2	0–8	1.6	2	0–6
Substitution	1.1	1	0–6	1.1	1	0–9	1.3	1	0–5	1.4	1	0–7	1.7	1	0–8	1.3	1	0–8
Omission	.2	0	0–4	.3	0	0–6		0	0–4	.4	0	0–4	.4	0	0–4	.4	0	0–3
Hesitation	1.0	1	0–4	1.1	1	0–7	.7	1	0–4	.9	0	0–7	2.0	1	0–8	.5	0	0–3
Punctuation	.3	0	0–4	.3	0	0–3		0	0–4	1.2	1	0–6	.7	0	0–5	.2	0	0–1
Total	3.64			4.10			4.40			7.33			7.00			4.05		

Table V shows the degree of difficulty of each of the three selections for which the average rate and error score indicate the average grade attainment.

Table V

Reading rate and average number of errors for each selection

Grade Selection	I		III		III		IV		V		VI	
	Errors	Rate	Errors	Rate	Errors	Rate	Errors	Rate	Errors	Rate	Errors	Rate
(1)	3.10	1.07	3.63	1.51	4.66	1.96	7.79	2.38	6.89	2.64	4.57	2.76
(2)	3.64	1.11	3.96	1.53	4.10	2.04	7.00	2.26	6.84	2.60	2.85	2.84
(3)	4.20	1.05	4.76	1.48	4.44	2.11	7.45	2.30	7.43	2.66	4.70	2.83

In combining the time and error scores in such a way as to give the best increase in score from one grade to the next, several possible combinations have been tried. Giving E (errors) the same value as R (rate) is obviously incorrect as R shows a constant increase where E is variable. E equals ½ R is very little better as the score very shortly shows a decrease. E equals ¼ R seemed to give the best results so we have used a combination where approximately such a value holds. In table VI the formulæ for the various grades are given using average errors.

Table VI

Reading tests scores

Grade I	10 R−E= 7.3
Grade II	10 R−E=10.9
Grade III	10 R−E=13.7
Grade IV	10 R−E=16.4
Grade V	10 R−E=19.0
Grade VI	10 R−E=22.3

R = average reading rate for the three passages for each grade.

E = total errors for the three passages for each grade divided by three to find the average number of errors for each passage.

This formula gives more value to the reading rate and at the same time in the event of an individual case scoring a high reading rate and an unusually large number of errors, evaluates the final result accordingly low.

In order to discriminate a reading ability below the first grade level, which is significant chiefly in dealing with the feeble-minded where it is sometimes desirable to indicate the difference between educability, however slight, and that "pitch black darkness of total ignorance" which even the gentle apologist, Crothers, does not find one of the "Honorable Points of Ignorance," we printed three short reading passages, choosing the vocabulary from primers used in beginning first grade. These passages were standardized by the writer taking the January scores for children in the first grade. The child read the words as the examiner pointed to them; errors consisted of unfamiliar words and ten second hesitations as indicated in the alternative procedure for first grade. The average rate as expressed in number of words read per second is .38, the average error score 4.4. Twenty-six selected cases were used in the standardization of these so-called primary passages.

Conclusions. Reading speed and comprehension are conditioned to an important extent by the legibility of the face of printing type used. The present reading scale printed in Century Oldstyle type fulfills the requirements, in so far as the investigations have determined, of the optimal conditions for the various school grades from first to sixth inclusive.

As a measurement of individual oral reading ability, the present scale shows a consistent increase in reading rate for the first six grades. Using the mental age of the child as the index of his mental capacity, the child should be given the reading passage for the corresponding grade, to measure the degree of attainment of the

mechanical processes of reading, the ability to pronounce words correctly, to read the words of the text without substitutions or omissions and without ignoring punctuation marks. To determine the reading capacity of a case with these standardized passages and scores, he should be tested with the different grade passages until the grade passages are reached for which he does not make the average score.

The present scale should be useful particularly in determining the reading ability of individual cases in connection with the mental examination and is intended especially for such use.

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EDITORIAL

PROBLEMS IN READING

In the construction of reading scales one of the chief objects is to devise some means of indicating the degree of comprehension of the passage read. In the Starch scale, the Brown scale, and some other scales the fidelity of reproduction is taken as the index of comprehension. This, however, depends upon memory, and its reliability is further invalidated by the fact that the labor of writing, especially in the lower grades, is so distracting as to banish the recollection of much that was comprehended. The degree to which writing interferes with recall varies greatly with different individuals and thus makes comparison of scores precarious as an indication of reading ability. It is natural, therefore, that experimenters should endeavor to reduce the burden of writing to a minimum. In the search for reading material whose comprehension can be indicated by a word or a mark the authors of the Kansas Reading Tests went

to the extreme of introducing arithmetical, physical and practical problems. The solution of these problems undoubtedly depends on the comprehension of what is read, but the mental processes involved are so much more elaborate than those brought into play in the grasping of ordinary reading material that the two activities are scarcely comparable. The Thorndike Scale Alpha calls for answers to questions on the paragraph read. This eliminates the memory factor, and approximates more closely the attitude of ordinary reading, but from Thorndike's own analysis of the mistakes in the answers the test seems to be one of the comprehension of the questions as much as comprehension of the passage read.

Many teachers are skeptical of all these measures of comprehension, and assert that the most reliable indication of reading ability is to be found in the way a child reads a passage aloud. The rate, the smoothness, the inflections of the voice, the expression with which the thought is rendered furnish the most definite indication of comprehension. This, of course, demands individual testing, which is much more costly in time than group testing. It also overlooks the fact that the mental attitude in oral reading is probably very different from that in silent reading. But the most serious drawback to this method is the fact that the estimates of quality of comprehension rest entirely upon the unaided subjective judgment of the listener, and we have no guarantee that the evaluation of the same reading will be the same at different times, or that two judges have the same standards. The only scale for oral reading that we have (Dr. Gray's) deliberately ignores the finer points of expression and voice modulation as indices of comprehension because of the difficulty of applying objective measures to them. The difficulty certainly exists, but is it insurmountable? Would it not be possible by pooling the ratings of competent judges to work out a scale of expression-comprehension in oral reading that could be used to steady the judgments of the individual teacher as do the composition and handwriting scales? In view of the fact that school reading is and will probably continue to be, chiefly oral reading, such a scale would be of great significance in the rating of pupils. If we had a reliable measure of comprehension in oral reading, we could then check up on the mental attitudes in oral and silent reading, and thus come to some more definite conclusions as to the relative values of each.

Again, much of the time now spent in oral reading in schools is practically wasted. Neither pupils nor teacher know just what they are trying to do. The use of such a scale would enable the teacher to diagnose the oral reading needs of pupils more exactly, and thus point the way to more effective remedial measures. Heretofore tests of reading have been considered almost altogether in the mass. There is great need of more intensive psychological studies to bring out the fundamental differences in reading ability, and to determine the degree to which the various scales reveal these differences.

J C. BELL

NOTES AND NEWS

Superintendent O. S. Hubbard, of Fresno, California, has been appointed director of the Bureau of Research of the Oakland School Department.

Captain Lawrence J. Cole has received his discharge from the army and has returned to his work as professor of psychology in the University of Colorado.

At the New York University Summer School Dr. J. Carleton Bell, of the Brooklyn Training School for Teachers, is giving courses in educational psychology and in educational measurements.

Dr. Daniel B. Leary, formerly head of the department of education at Tulane University, has been appointed professor of psychology at the University of Buffalo.

Mr. H. W. Anderson, statistician of the school system of Omaha, Nebraska, has been appointed to a similar position in Detroit.

Dr. W. Franklin Jones, of the University of South Dakota, has been appointed dean of the school of education of the University of Southern California at Los Angeles.

A Bureau of Cooperative Educational Research will be organized during the year 1919-1920 by the school of education of the University of California in order to make available to the schools of the state the expert services of members of the education faculty.

Lieutenant J. L. Stenquist, who has been on special duty as psychologist examiner in the Air Service of the United States Army, has resumed his work in the Bureau of Reference, Research and Statistics of the Department of Education, New York City.

Dr. Harry Woodburn Chase, professor of psychology in the University of North Carolina, has been elected president of that institution.

Professor Frank E. Morris has returned to the Connecticut College for Women as professor of psychology and ethics. Professor Morris has been serving in the psychological department of the Sanitary Corps of the Army.

At the annual meeting of the District of Columbia Chapter of the Society of the Sigma XI on March 6 Major R. M. Yerkes, Sanitary Corps, U. S. Army, gave an illustrated lecture on the "Relationship of Army Mental Tests to Education and Vocational Guidance."

It is stated that Professor James R. Angell, director of the psychological laboratory, University of Chicago, has been offered the presidency of the University of Michigan, but that owing to disagreement as to conditions the offer has been declined.

The *Institut de Puericulture de la Faculte de Medicine de Paris* was inaugurated on July 1. The Institute was established by the million francs donated to it by the American Red Cross, supplemented by another million francs contributed by French philanthropists.

It is proposed to establish an institute of commercial and industrial psychology and physiology in England. Among the scientific supporters of the undertaking are Professor C. S. Sherrington and Lieutenant Colonel Charles S. Myers. The secretary is Mr. G. Spiller, 1 Great Tower Street, E. C. 3.

The governor of Pennsylvania has recently signed a bill providing for handicapped children in the public schools. Mental and medical clinics are provided to ascertain the children who are in need of special treatment because of defects of vision, hearing or intelligence. It is estimated that 150,000 school children need to be examined, although probably not more than 15,000 could be classed as feeble-minded.

Professor L. L. Thurstone, of the Carnegie Institute of Technology, recently issued a revised form of his tests for the psychological examination of high school seniors and college freshmen. They consist of a single folder containing 168 short problems and involve information, mixed relations, completion, syllogistic reasoning, and the explanation of proverbs and statements. The time limit is 30 minutes. The frequent repetition of the same type of test should make the results very reliable in so far as these tests afford a valid diagnosis of intelligence.

The Sixth Annual Conference on Educational Measurements was held at Indiana University on Friday and Saturday, April 18 and 19. The chief speakers were Professor W. W. Charters, of the University of Illinois, and Dr. Walter S. Monroe, director of the Bureau of Cooperative Research, Indiana University. Professor Charters spoke on "The Diagnosis and Correction of Grammatical Errors," "Scientific Curriculum Construction," "Educational Diagnosis and Corrective Instruction," and "Diagnosis and Correction of language."

Dr. Monroe took as his topics "The Progress and Promotion of Pupils in Certain Indiana Cities," "Next Steps in Educational Measurements," "Plans of the Bureau of Cooperative Research," and "Pupils' Errors in Arithmetic." Dr. Ernest J. Ashbaugh, Director of Educational Service of the University of Iowa, spoke on "Educational Service in Iowa," and "Some Recent Developments in Spelling." Other reports were "Results of Group Testing in the Army," "Mental Defectives in the Rural Schools of an Indiana County" by Hazel Hansford, "A Group Scale of Intelligence for First and Second Grades" by Mrs. Sidney L. Pressey, and "School Surveys by Means of Group Tests of Intelligence" by Sidney L. Pressey.

The Sixth Annual Schoolmen's Week convention, held last spring at the University of Pennsylvania, exceeded all records both for attendance and interesting discussions. Among the most notable features was the report of the Bureau of Educational Measurements of the University, presented by Dr. Harlan Updegraff, director, and Mr. L. A. King, assistant director. The announcement that this Bureau had superintended the giving of 200,000 tests in arithmetic and 70,000 tests in silent reading in the schools of Pennsylvania since September, 1918, made a deep impression upon the visiting schoolmen. Not only was this department of the University's School of Education warmly commended, but a more extensive

use was urged of this system. Of the 200,000 tests made in arithmetic, 100,000 were in the Philadelphia schools. This was the first time that the school authorities of Philadelphia had made such tests, and they naturally turned to the University to have them supervised.

Announcement is made by the Carnegie Institute of Technology of the promotion of Lt. Colonel W. V. Bingham to be dean of the division of applied psychology. This faculty includes the departments of psychology, of vocational education and of personnel administration, with which is affiliated the bureau of salesmanship research and the research bureau for retail training. This division has been strengthened by the addition of two new men: Major C. S. Yoakum, of the psychological section of the Surgeon General's Department and formerly of the University of Texas, has been appointed professor of applied psychology and will be director of the bureau of salesmanship research. Lieutenant Colonel Edward K. Strong, Jr., has been made professor of vocational education and assumed on April 1st responsibility for the department for the training of vocational teachers. Colonel Walter Dill Scott will continue his connection with the bureau of salesmanship research as associate director, but will devote only part of his time to the work.

Commissioner Burdette G. Lewis has been authorized by the State Board of Control of Institutions and Agencies of the State of New Jersey, to institute a program of psychiatrical and psychological work that is of special interest to educators and criminologists. It is planned immediately to conduct psychiatrical and psychological examinations in all state correctional institutions and ultimately to extend the work to the other institutions and agencies under the jurisdiction of the state board. The work will be under the general supervision of Dr. Henry A. Cotton, medical director of the New Jersey State Hospital, as acting director of the Division of Medicine and Psychiatry of the Commissioner's staff. The immediate direction of the psychological work of the Division will be under the supervision of Mr. Edgar A. Doll, formerly research psychologist at the Training School at Vineland. All entrants at the correctional institutions will be given a psychiatric test and the Army Group Test. It is also planned, as far as possible, to use the clinical procedures and tests developed in the Army for the psychological examination of recruits. The Army Group Test Alpha, has already been applied to nine hundred men in the New Jersey State Prison, and five hundred public school children of Trenton. It is planned that the psychological examinations shall be the basis of classifica-

tion for the educational, vocational, industrial and parole activities of the correctional institutions of the state. The administrative policies of the several institutions are being re-organized on the basis of the psychological results thus far obtained. The work of the Division of Medicine and Psychiatry will be brought in immediate contact with the Division of Education and Parole and the Division of Labor and Agriculture, of which Mr. Calvin Derrick and Mr. David I. Kelly are the respective directors. Dr. J. M. McCallie, assistant director of education and parole, who has made some extensive researches in the field of applied psychology, will assist in co-ordinating the educational work of the institutions with the educational work of the public schools through the use of these tests. It is planned to extend the plan of work as rapidly as possible. Results thus far obtained are very promising, and indicate that there is an important relation between psychological diagnosis and classification, and institutional management and administration.

PUBLICATIONS RECEIVED

OTIS W. CALDWELL. *The Gary Public Schools: Science Teaching.* New York; General Education Board, 1919. Pp. xix, 125.

This number of the Gary Survey is particularly interesting and valuable to students of the science of education in that almost half of the volume is devoted to the description and discussion of tests in elementary science. So far as the science work in the Gary schools is concerned tha author finds the time allotment fairly generous and the intentions good, but the work is of uneven excellence and suffers from lack of continuity and organizing purpose. Of the nine tests described four were designed to test observation and discrimination, three to test recall and use of previous experiences, and two to test ability to see what occurs and to interpret or give reasons for the occurrences. Test I involved the comparison of a white oak leaf with an elm leaf; test 2, a white oak leaf with a red oak leaf; test 4, the picture of a kingbird with the picture of a kingfisher; test 5, the picture of a kingbird with the picture of a flycatcher. In each of these pairs of comparisons the effort was made to get first a pair that was strikingly different and then a pair that had many points of resemblance. In test 3, the pictures of eight common birds were presented and the pupils were asked to write the name of each. In test 6 ten common birds were named and the pupils were asked to select any four and to tell about each in what kinds of places it builds its nest, of what material and at what time of year it builds its nest, and upon what it feeds its young. In test 7 the names of ten common insects were given, the pupils were asked to select any four, and to indicate about each the kind of place in which it lives, the appearance of the young, the food upon which the young lives, and the harm or good done by the insect. In test 8 the "smoke-box" experiment, a candle placed under an opening in the top of the box caused a current of air which drew part of the smoke from lighted punk through the box. The pupils were asked to tell what was done, what movements of smoke occurred, and what made part of the smoke move through the box. Test 9 showed a funnel passing through a cork fitted into the neck of a tall jar. As water was poured into the funnel the pressure of the air inside the jar tended to balance the weight of water in the funnel. When the cork was loosened slightly bubbles of air escaped and water ran from the funnel into the jar until the equilibrium was again established. The pupils were asked to explain why the water flowed from the funnel into the jar, why it ceased to flow when the cork was pressed into the neck of the jar, and why it flowed again when the cork was loosened. Elaborate directions are given for marking and scoring each test, and the results from various classes are offered as norms. These are the most carefully standardized tests in nature study yet produced.

KATHERINE DUNLAP CATHER. *Educating by Story-Telling.* Yonkers-on-Hudson; World Book Company, 1918. Pp. xx, 396. $1.60.

The story has always been one of the most effective means of imparting information and stimulatin6 the reflective imagination. In this age of dependence upon

books the story is apt to be overlooked and neglected for more direct forms of instruction. This charming book stresses the purpose and aim of story telling, discusses four periods of story interests, describes the building and the telling of the story, and shows how stories may be used to develop an appreciation of literature, music, painting, drama, the Bible, and ethical conduct. Part II contains between thirty and forty stories for telling. The bibliographies are voluminous and well selected. and the book is a treasure-trove for the story teller, whether teacher or parent.

MARION COLLINS. *Case Studies in Mental Defect.* New York State Board of Charities, Bureau of Analysis and Investigation, Eugenics and Social Welfare Bulletin No. xiv, 1918. Pp. 177.

Of the various causes for feeble-mindedness advanced by Tredgold and others psychopathic heredity seems to be the most constant and definite antecedent brought out in these studies. Unusua opportunities were afforded the investigator to observe the evil effects of maladjustment upon individuals and families, and to trace typical anti-social traits in members of the family groups through successive generations. The monograph contains an interesting consideration of the stability of the moron, and an extensive discussion of the sociological significance of mental defect.

ALBERT S. COOK, LIDA TALL AND ISOBEL DAVIDSON. *Course of Study, Baltimore County, Maryland, Public Schools, Grades I to VIII.* Baltimore: Warwick and York, 1919. Pp. viii, 698.

A course of study may serve two functions: A guide to the teachers in that system in which it has been adopted, and a stimulas and source of suggestion to teachers in other systems. One of the greatest needs in education today is to have courses of study made accessible so that they may be compared with each other and the various methods of procedure analyzed. The Baltimore County course of study is noteworthy in several respects. It is sufficiently detailed to indicate not only the material covered in each subject for each grade but also the methods by which the results may be obtained. Each section has exceptionally complete references to the literature of the subject. It is strictly up to date in utilizing the results of the scientific studies of education in class room procedure, as shown in the use of the Thorndike, Ayres and Freeman material in handwriting, the Buckingham and Ayres lists in spelling, and the Courtis tests in arithmetic. The space devoted to history alone is over 150 pages. We predict a wide use of the book for both the purposes mentioned above.

MELVILLE THURSTON COOK. *Applied Economic Botany.* Philadelphia: J. B. Lippincott Company, 1919. Pp. xviii, 261. $1.60.

This text, which according to the sub-title is "based upon actual agricultural and gardening projects," presents a selection of those aspects of botany in which

the general public is most directly interested. The discussion is clear and comprehensible, the text is well printed and sub-divided for study purposes, each chapter is followed by numerous exercises and questions, and the pages are profusely and splendidly illustrated. The book may be used to advantage with either high school or college classes.

GEORGE VAN NESS DEARBORN. *The Psychology of Clothing.* Psychological Monographs, Vol. 26: No. 1, Whole No. 112, 1918. Pp. vii, 72.

Whatever may be the amount of truth in the old proverb that 'clothes make the man' it is undeniable that clothes have a marked psychological effect both upon the wearer and upon the observer. A careful analysis of this effect from the critical point of view of modern psychology is here attempted for the first time. It is a pioneer work, aptly characterized by the author as "a kind of scientific ghost of 'Sartor Resartus' ," and distinguished by the author's well known facility of expression. The subject is treated first as a chapter in physiologic psychology, in which clothing is considered in relation to the skin, to bodily action and to bodily temperature. It is then regarded as a phase of applied psychology and stress is laid upon freedon from fear, the subconscious effects of clothing, self-confidence and success, fitness and the significance of well-fitting clothing, clothes and personality, and the influence of clothing upon initiative.

A. E. DOBB *Education and Social Movements 1700-1850.* New York: Longmans, Green & Co., 1919. Pp. xiv. 257. $3.50.

This is a study of the influences that have affected the development of educational thinking and practice in modern England. The remark that "progress in English education has owed less to the zeal of its advocates than to changes in the structure of social life which have often no apparent connection with educational movements" is probably applicable to other countries as well, and is becoming increasingly applicable as education grows more social in its aim. The author paints a vivid picture of social England at the eve of the industrial revolution, considers the effect of the development of cheap literature upon education, and notes the religious, political and industrial unrest at the close of the eighteenth century. In Part II he gives a sketch of the rise of elementary education in the first half of the nineteenth century, the monitorial system, the mechanics' institute movement, working men's colleges and clubs, the communistic movement of Robert Owen, the growth of libraries, the work of the Tract Societies, the Chartist press, the rise of the democratic ideal, the Hampden Clubs, the increase of manufactures in the nineteenth century, and problems of adolescent and adult education. The book closes with a consideration of modern criticisms of organized education in the light of earlier history. It furnishes a valuable background for understanding present tendencies in English Education.

GEORGE DUMAS ET HENRI AIME. *Nevroses et Psychoses de Guerre chez les Austro-Allemands.* Paris Felix Alcan, 1918. Pp. 243. 6 francs.

However violent may be the feelings of the French for the Germans at the present time bitterness does not blind them to the desirability of taking advantage of any observations and studies that the Germans may make in the advancement of scientific knowledge. In the present book the authors present the substance of three reports made by Dr. A. Birnbaum, of Berlin, summarizing the various studies that have been published in technical German periodicals dealing with the normal and pathological psychology of the German peoples under war conditions. These reports were published in 1915-1916, and therefore give us the German reaction to only the first two years of the war. The book opens with chapters on general psychology and psychopathology, discusses war neurasthenia, and devotes the most of the space to a consideration of such psychogenic disturbances as fear neuroses, traumatic neuroses and types of hvsteria.

Fourth Conference on Educational Measurements, Indiana University. Bulletin of the Extension Division, Vo. III, No. 8. April 20 and 21, 1917. University Book Store, Bloomington, Ind., 1917. Pp. 135. $0.50.

The special speakers at this conference were Professor G. D. Strayer, of Teachers College, and Professor C. H. Judd, of Chicago University. Professor Strayer spoke on "The Scoring of School Buildings," "Standardizing the School Plant," "Significance and Present Status of the Survey Movement," and "Practical Improvement in General School Administration Resulting from the School Survey." Professor Judd gave a "Demonstration of the Gray Reading Tests, with Lantern Slides," discussed "Reading Tests," held a round table conference on reading, and spoke on "Experiment in Education," and "Practical Results Obtained Through the Use of Standardized Tests in School Achievement." Other reports presented were "A Study in Arithmetic (Courtis Tests, Series B) in Indiana Cities," by H. L. Smith; "The Value and Use of a Scale in Handwriting (Ayres)," by W. W. Black; A Study in Reading (Gray Oral and Silent Tests) in Indiana Cities," by Cecile W. White; "Suggestions Pertaining to the Training of Feeble-Minded Boys in the Public Schools," by Calvin P. Stone; "Experimental Work in Indiana Schools," by W. F. Book; and "Determination of Standards in Vocational Education," by R. J. Leonard.

LEE F. HAMMER. *The Gary Public Schools. Physical Training and Play.* New York: General Education Board, 1918. Pp. xix, 35.

So much has been made of the opportunities for supervised play in the Gary system that one looks eagerly for the results of the survey in this activity. The report considers facilities afforded for play, the teaching staff, the instruction, and the showing made by the pupils in the Athletic Badge Tests issued by the Playground and Recreation Association of America. The time allotted to play is generous and the facilities in the way of equipment are above the ordinary. The

teachers are well trained, but the classes are entirely too large for any real systematic instruction. On the tests the Gary pupils are below the average of pupils of like age in New Orleans, Seattle, Buffalo and New York in almost every instance. The reason for this the author finds in the amount of time devoted to "free play," which under the mass conditions prevailing often degenerates into mere 'fooling.' On the other hand the Gary pupils seem to be somewhat superior in endurance, as shown by the scores in the last half of their games.

E. WASHBURN HOPKINS. *The History of Religions.* New York: The Macmillan Company, 1918. $3.00.

To present the history of the chief religions of the world in a single volume is a task which demands marked skill in the judicious selection of materials. The author has felt his limitations of space, and has been obliged to pass over many interesting details in the religious beliefs and practices of various countries. On the other hand the account possesses a continuity and carrying power which is lacking in many of the larger and more diffuse works. In spite of his limitation of space the author interpreted his task in a broad sense and endeavored to present a clear picture of the religious consciousness of the entire human race. Thus we find a concise account of the religions of various African tribes, of the Ainus and Shamans (Mongolians), of the Polynesians, of the North American Indians, of the inhabitants of Mexico, Central and South America, of the Celts, the Slavs and the Teutons. The historic religions of India, China, Japan, Egypt, Babylonia, Persia, Israel, Mohammed, Greece, Rome, and Christendom receive more extended treatment. Throughout, the narrative is based on the results of the latest and most exacting scholarship, and voluminous references are given to the authorities. In no way can one obtain such a clear idea of the development of human standards of conduct as through the study of religious beliefs, and this volume is most cordially recommended to psychologists and educators as the latest and in many respects the best book on the subject.

HENRY GUSTAVE HOTZ. *First Year Algebra Scales.* New York: Teachers College, Contributions to Education, No. 90, 1918. Pp. 87. Cloth, $1.30. Paper, $0.80.

The student of the science of education rejoices to see the gradual spread of the measurement idea to the field of secondary subjects. Rugg, Monroe and Childs have already devised tests in elementary algebra, and in the present volume we have a series of scales which promise to be more precise and convenient than anything yet presented. The monograph makes a brief reference to previous work in the measurement of results in algebra, presents the scales with tentative standard scores, and gives an account of how the scales were developed. The scales are as follows: 1. Addition and subtraction. 2. Multiplication and Division. 3. Equation and formula. 4. Problems. 5. Graphs. Like the Woody arithmetic scales

these scales are arranged in two series, series A, the shorter form, on which twenty minutes are allowed for each exercise, and series B, the longer form, which contains a richer variety of test materials, and for which forty minutes are necessary. Series A is adapted for general school testing, where time is limited, while series B is better suited for individual diagnosis. Both series cover the same range of difficulty, but series B is the richer and more varied. The author emphasizes the fact that these are power rather than speed tests, and that in the time limits fixed the greater number of the pupils should be able to finish the tests. Tentative standard scores are indicated on the basis of the application of the tests to over three thousand pupils who had studied algebra for three, six or nine months.

ELLSWORTH HUNTINGTON. *World-Power and Evolution.* New Haven: Yale University Press, 1919. Pp. 287. $2.50.

This is one of the most stimulating and significant books of the year. The author follows out the argument laid down in his previous book *Civilization and Climate,* that climatic energy is the most important factor in physical environment and that its distribution determines the distribution of civilization upon the earth's surface. The present volume applies this theory to the conditions arising out of the world war. Business activities vary in extraordinary harmony with health, and health depends upon the weather more than upon any other single factor. This thesis is here applied to the explanation of business cycles in this and foreign countries, to a theory of variability in hybrids and the development of new types among animals and men, and especially to the elucidation of periods in literature and other types of mental activity. The rise and fall of the Roman Empire is taken as an example, and the same method of reasoning is then brought to bear upon the solution of the problem of Turkey. In a final chapter the author points out that no nation in the world has so many people who live under a highly stimulating climate as Germany, and attributes to this fact the wonderful power and endurance she showed in holding out for four years against the entire world. This favorable situation, he thinks, will make Germany's influence felt in strong measure in the coming decades.

HERBERT GARDINER LORD. *The Psychology of Courage.* Boston: John W. Luce and Company, 1918. Pp. viii, 164. $1.25.

"All normal men are afraid That is why they can be brave. He who is not afraid cannot be brave. He who is brave must of necessity be afraid. The measure of his courage is the violence of his fear successfully overcome." Courage, then, rests on such an overbalancing of the fear impulse by instinctive or reasoned motives that one's objectives are attained in spite of the fear. This discussion of courage is based upon the mechanistic conception of human behavior, and proceeds from the fundamental physiological mechanisms, through the inborn mechanisms, or instincts, (among which we find fear), to the acquired types of reaction, the simpler

and lower forms of courage, and finally to the higher and more complex types. True courage is thus a matter of training, and the special training necessary to develop different types of courage constitutes the climax of the discussion. It is obvious that this is distinctly an educational book.

JOHN BACH MCMASTER. *A Brief History of the United States.* (Revised and enlarged). Cincinnati: American Book Company, 1918. . p. 466, xxx.

This school history, by the author of the encyclopedic *History of the People of the United States*, is marked by accuracy and scholarship on the one hand and by simplicity and directness of style on the other. The text is richly illustrated, well provided with maps, and brought quite up to date. The part played by America in the World War receives due consideration, and the story concludes with the signing of the armistice.

CHARLES MERCIER. *Crime and Criminals.* New York: Henry Holt and Company, 1919. Pp. xvii, 290. $2.50.

The author shows little respect for continental European writers on criminology, and adopts an attitude of 'common sense' in regard to the treatment of criminals. He defines crime as "acts or omissions that are infractions of the law, not as it is, but as I conceive it ought to be." This personal interpretation of the law, and personal reaction to criminal situations is characteristic of the entire discussion. As medical officer of lunatic asylums the author has had a certain amount of first hand contact with criminals, and as a writer on mental abnormality he has achieved a certain reputation. His opinions are set forth vigorously and dogmatically, but in no case does he penetrate deeply into the psychology of crime. A characteristic statement is the following: "The first lesson in morality is the cultivation of *esprit de corps*. It is because *esprit de corps* is so thoroughly inculcated and cultivated in our (English) public schools that the education they afford, contemptible as it is from the intellectual point of view, is so invaluable as a moral training."

JAMES BURT MINER. *Deficiency and Delinquency, an Interpretation of Mental Testing.* Baltimore: Warwick and York, 1918. Pp. xiv, 355. $2.25.

Is the mentally defective predisposed to become a criminal, and are all criminals mentally defective? Extravagant claims have been made as to the percentage of feeble-minded in our jails and penitentiaries, and one might be tempted to believe that deficiency and delinquency were synonymous. In the present volume a thorough and scholarly survey is made of the entire question, the evidence of previous studies is carefully sifted, and a method is worked out for evaluating the limit of feeble-mindedness. The author's own studies on delinquents in the Glen Lake Farm School for Boys, Minnesota, are reported in detail, and an extensive com-

parison is made between school retardation and tests of deficiency among delinquents. Part II of the volume is devoted to a discussion of the theory of the measurement of mental development, and to quantitative definitions of the border-line between intelligence and feeble-mindedness. There is a bibliography of 228 titles.

G. H. PARKER. *The Elementary Nervous System.* Philadelphia: J. B. Lippincott Company, 1919. Pp. 229. $2.50.

The behavioristic conception of psychology brings into greater prominence than ever the structure and functioning of the nervous system. In no other way can human behavior be explained than through the action of the neuro-muscular arc An essential phase in the understanding of this neuro-muscular arc is the study of its development in the evolution of animal life, and it is to the problem of the origin and action of this arc in some of the simpler organisms that this study is directed. The volume is the second of the *Monographs on Experimental Biology* issued under the editorship of Jacques Loeb, T. H. Morgan and W. J. V. Osterhout. The discussion deals chiefly with the behavior of sponges, coelenterates and otenophores. In sponges there is no trace of nerve elements, but there is contractile tissue about the pores and the osculum. This supports the thesis that muscular tissue is primary, and that nervous connection is a later development. Studies of the sphincter pupillae and of certain heart muscles confirm the view that contraction under direct stimulation is the primitive type of motor response, and that neural control is a later stage in evolution. The development of neurones in metridium, the aggregation of these neurones into a nerve-net, and the growth of the nerve-net into a well-defined nervous system constitute the chief steps of the argument. There is a bibliography of ten pages. The book is invaluable to the behaviorist.

T. GILBERT PEARSON. *Tales from Birdland.* New York: Doubleday, Page and Company, 1918. Pp. 237. $1.00.

These delightful bird stories make fascinating reading for both children and grown-ups. One does not have to read far to gain the conviction that the author is an authority on bird life, and it is evident from the start that he can tell a good story. These two facts make the book a most desirable addition to the supplementary reading of children in the grammar grades.

RUDOLF PINTNER. *The Mental Survey.* New York: D. Appleton and Company 1918. Pp. x, 116. $2.00.

When an effort is made to find the number of feeble-minded children in a school, it is desirable to avoid needless testing of perfectly normal children. A series of preliminary group tests saves much time and energy. Such a series of tests is here presented. The application of the mental survey to schools and the evaluation of

school achievement in terms of mentality are the most important aspects of the present study. The tests selected include rote memory (Pyle), digit-smybol substitution (Whipple), symbol-digit substitution (Pyle), word building (Whipple), opposites (Thorndike), cancellation (Whipple), language completion (Trabue), and Courtis arithmetic, Series B. Percentile tables of distribution drawn from tests of between three and four thousand children are given for the first tests, and the mental indices by grades are indicated for six schools. The results of the survey tests were checked by comparison with teachers' extimates, and with findings by the Binet and Yerkes scales. Percentile tables of the results with the Trabue and the Courtis tests are also indicated, and these are compared with the findings from the other tests. The second part of the book is a guide for the mental survey, containing directions for giving the tests, for scoring them, and for evaluating the results.